

COMPTON'S

PICTURED ENCYCLOPEDIA

AND

FACT-INDEX

INTERESTING • ACCURATE • UP-TO-DATE



To inspire ambition, to stimulate the imagination, to provide the inquiring mind with accurate information told in an interesting style, and thus lead into broader fields of knowledge—such is the purpose of this work

VOLUME 14

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1922, 1923, 1924, 1925,
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1934, 1935, 1936, 1937,
1938, 1939, 1940, 1941,
1942, 1943, 1944

Here and There in This Volume

AT ODD TIMES when you are just looking for "something interesting to read," without any special plan in mind, this list will help you. With this as a guide, you may visit far-away countries and watch people at their work and play, meet famous persons of ancient and modern times, review history's most brilliant incidents, explore the marvels of nature and science, play games—in short, find whatever suits your fancy of the moment. This list is not intended to serve as a table of contents, an index, or a study-guide. For these purposes consult the Fact-Index and the Reference-Outlines.

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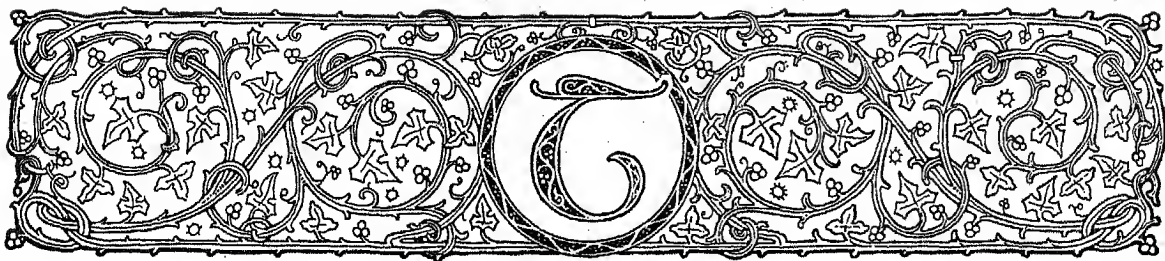
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Key to Pronunciation

Pronunciations have been indicated in the body of this work only for words which present special difficulties. For the pronunciation of other words, consult the Fact-Index. Marked letters are sounded as in the following words: *cāpe*, *āt*, *fār*, *fāst*, *whāt*, *fāl*; *mē*, *yēt*, *fēr*, *thēre*; *īce*, *bīt*; *rōw*, *wōn*, *fōr*, *nōt*, *dō*; *cūre*, *būt*, *rūde*, *full*, *būrn*; *û* = French *u*, German *ü*; *gem*, *gō*; *thin*, *then*; *ñ* = French nasal (*Jean*); *zh* = French *j* (*z* in *azure*); *x* = German guttural *ch*.



TACOMA, WASH. Standing near the southern end of Puget Sound, 150 miles from the Pacific Ocean, Tacoma is superbly situated for world trade. Ships from all over the world come to its fine harbor on Commencement Bay. Hence it is the natural manufacturing and shipping center for the timber of the Cascade Mountains to the east, for the gold and silver of the mines of northern and western Washington, for the coal of the Puget Sound basin, and for the berries, vegetables, and flower bulbs of the fertile Puyallup Valley.

Its many lumber and pulp mills, furniture factories, and other wood manufactures have earned for Tacoma the name "lumber capital of America." It also has one of the largest smelters in the United States. Copper ore from Alaska, Chile, and other countries comes to Tacoma for refining. Wheat from the northwestern grain region is brought to the port for milling and export. Two of the four transcontinental railroads which serve the city have their western car-building and repair shops here. There are also electrochemical plants and a shipyard.

From wharves, railway yards, mills, and warehouses on the tideflats, the city rises to a plateau some 200 feet high; and then climbs up into the hills. It looks west over the blue waters of the sound to the Olympic Mountains and east to the Cascades. Far to the southeast looms snow-capped Mount Rainier, or Tacoma—"the mountain that was God."

On this plateau and along the shores of four freshwater lakes near by are beautiful homes with fine grounds. Roadways and trails wind through the vir-

gin woodlands of Point Defiance Park, which has a zoo and a reproduction of old Fort Nisqually. Three hundred different kinds of trees grow in Wright Park. The Washington State Historical Society Museum contains Indian handicraft and early pioneer equipment. Besides the public schools, which include the Stadium High School with its Greek amphitheater overlooking Commencement Bay, there are the College of Puget Sound and the Annie Wright Seminary for girls.

Electric power is supplied at low rates by municipally owned hydroelectric plants in the mountains. The city also owns its water supply and maintains a belt-line railroad. The airport is owned and operated by Pierce County.

McChord Field, the army air base for the Pacific northwest, is ten miles south of the city limits. Farther south is Fort Lewis, a 70,000-acre army post. Mount Rainier National Park is about 55 miles away.

The Tacoma Narrows Bridge, the world's third longest suspension bridge, was completed in July 1940. A few weeks later it was wrecked by a gale, but plans were at once drawn up to rebuild it.

George Vancouver visited the site of Tacoma in 1792. The Hudson's Bay Company built a fort at Nisqually, a few miles away, in 1833. In 1841 Charles Wilkes began a government survey of Puget Sound at Commencement Bay and gave the bay its name. The city was organized in 1884 by consolidating Old Tacoma, laid out in 1868 by Gen. M. M. McCarver, and New Tacoma, the terminus established by the Northern Pacific Railroad in 1873. Population (1940 census), 109,408.

PRESIDENT TAFT *and* His ADMINISTRATION

TAFT, WILLIAM HOWARD (1857-1930). No man ever came to the White House better prepared for his task than William Howard Taft, 26th president of the United States; and no ex-president ever performed greater service to the people after leaving office.

Unlike many of the presidents, Taft was a trained public executive. For nearly 30 years he had been learning the art of government in disinterested devotion to the public welfare. Yet he was unfortunate in the four years that he served as president, and the substantial work that he accomplished was partly hidden by the quarrels that split the Republican party.

Taft came from a Cincinnati family of means and high social position. His father, Alphonso Taft, had been attorney general in Grant's cabinet, and then

minister to Austria and to Russia. At graduation from Yale in 1878 young Taft stood second in his class, and two years later, graduating from the law school at Cincinnati, he and another shared first place.

Rapid Rise in Public Life

Taft's capacity for hard work brought quick recognition. Before he was 30 he had been assistant prosecuting attorney of Hamilton County, collector of internal revenue, and assistant solicitor of Hamilton County. He then served three years as judge of the state superior court, resigning to become solicitor general of the United States. Between 1892 and 1900, as judge of the federal appellate court, he established a national reputation by decisions involving trusts, railroads, and labor unions. In 1900 President

McKinley, needing a strong, patient, brave man to erect a civil government in the Philippine Islands after the insurrection under Aguinaldo should die out, sent Taft to Manila. There, July 4, 1901, he received his appointment as first civil governor of the islands.

Taft was opposed to the retention of the Philippine Islands by the United States, and took up their government with a deep sympathy and love of justice that soon endeared him to the native population. In 1904, President Roosevelt called Taft to Washington, to succeed Elihu Root as secretary of war.

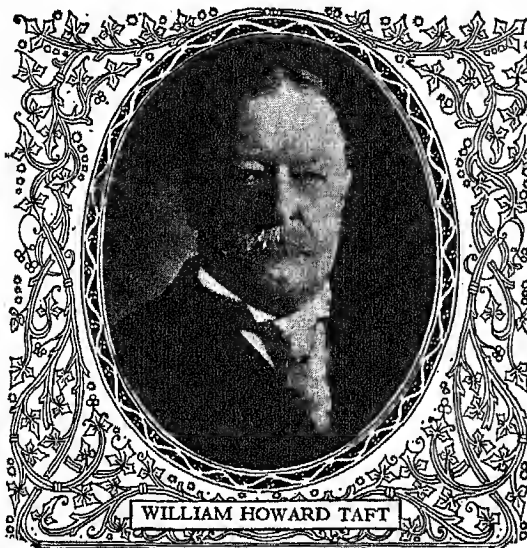
This change left Taft still indirectly responsible for the Filipinos, for the government of the island possessions was supervised by the War Department. In 1907 he went back to Manila to open the first legislature. He also served for a short time as governor of Cuba when an insurrection caused American intervention. By now Taft was "handy man" for the President, for Roosevelt soon learned that whatever task was assigned to Taft would be done well. Sometimes he was called the "traveling secretary," because he was so often sent to represent the President; or he was delegated to "sit on the lid" when Roosevelt himself was out of Washington. He explained the "Roosevelt policies," and gave them enthusiastic support, for his mind, though legal, leaned to the progressive view that law is made for man, not man for the law.

Taft and the Roosevelt Policies

When the time came to select a successor who might in the next administration carry these Roosevelt policies into effect, Taft was the choice of Roosevelt (see Roosevelt, Theodore). He was easily elected president in 1908, over William J. Bryan, who was now for the third time defeated; and in 1909, with James S. Sherman as vice-president, he began a term that was doomed to trouble. Roosevelt had managed to keep the Republican party from an open split. But the lines, beneath the surface, were sharply drawn between the "stalwart" or "standpat" faction that wanted no change in public policies, and the younger politicians, who hoped to use the full strength of the government to curb the trusts and the railroads. Roosevelt, generally siding with the progressive faction, left office deeply hated by the stalwarts; but he had kept both factions from open rebellion. Taft proved to be unable to control them, and disappointed both. He was too progressive ever to receive full support from stalwarts; and he was too judicial for the liberals and radicals who thought themselves

progressive. He lacked the art of creating enthusiasm or inspiring a public following. He became president with doubts in his own mind, for he thought himself best fitted for the bench, and had long cherished the ambition to be chief justice of the Supreme Court.

When Taft became president, the Republican party had for 12 years been in complete control of the national government; and for most of that time the United States had enjoyed an unusual degree of prosperity. The rich were everywhere getting richer. Business was arrogant, insisting on its rights, and expecting the government to protect it. The farmers, beginning to want automobiles and the new mechanical conveniences, thought the government was too much under the influence of "Wall Street." For several years a group of radical newspapers had been engaged in



showing up the sins of big business; "muck-raking," as it was called. Labor was providing for itself a better organization through its unions, and was striving for laws in its behalf. Immigrants were coming into the United States to compete for jobs at the rate of about 1,000,000 a year. Labor wanted immigration restricted, and the courts forbidden to issue injunctions to break up strikes. It had been well disposed towards Roosevelt, who preached the "fair deal" to all; but it mistrusted Taft because he, while federal judge, had given decisions restricting labor and in one important case had granted an injunction against striking railroad employees.

The first task before the Taft administration was a revision of the tariff, which had been under discussion since 1900 (see Tariff). The West wanted a set of lower rates; the manufacturing East wanted full protection. The new Congress was organized with "standpat" Republicans in control. The new Payne-Aldrich tariff, completed in August 1909, left the tariff schedules substantially as high as before, and even raised some important duties. It seemed a clear violation of the party platform promising revision downward. As a result, the more progressive western Republican leaders were in open revolt, charging that Taft had abandoned the Roosevelt policies.

A difference of opinion respecting conservation became a political issue soon after the Payne-Aldrich tariff was enacted. Roosevelt had been an ardent and vociferous supporter of the conservation of natural resources (see Conservation). Charges were now heard that the new secretary of the interior, Richard A. Ballinger, was favoring the coal companies, the

mining companies, and the timber interests that were exploiting the public lands of the West. The problem was difficult and technical, because most of the laws were based on the assumption that the lands were to be used for ordinary farms; and there was inadequate provision for mining, lumber, and water-power development. A quarrel involving Ballinger, representing the public land interests, and Gifford Pinchot, the forester of the United States, became an open scandal, requiring Taft to intervene. He upheld Ballinger, who was Pinchot's superior, and dismissed Pinchot; whereupon the western Republicans, now called Insurgents, attacked Taft as the agent of big business and as a traitor to the cause of conservation. An investigation by Congress upheld the President; the Insurgents called it "whitewashing" Ballinger.

The split between the two Republican factions was so bitter that in March 1910, the insurgent Republicans combined with the Democrats to change the rules of procedure in the House of Representatives. Under the old rules the Insurgents were regularly suppressed by the speaker, Joseph G. Cannon, who was considered an ally of President Taft. He generally refused recognition to Insurgents when they arose to speak unless they had previously obtained his consent; he appointed all committees, and was the leading member of the committee on rules, which controlled the course of legislation. Under the new rules the speaker was ineligible for membership on the rules committee, and the House selected its own committees. In the fall elections of 1910 the Democrats followed this success by winning a majority in the House.

The noisy quarrels, and Taft's inability to rise above them and dominate the situation, obscured many achievements. The Panama Canal was nearly finished, and a law was passed for the government of the Canal Zone. Alaska was made a territory in 1912, and Arizona and New Mexico were admitted as states. The Interstate Commerce Commission was given additional powers, and a Bureau of Mines was created. Two new amendments to the Constitution were adopted by Congress, and submitted to the states for ratification. The 16th gave Congress the power to levy a tax on incomes; and after its adoption in 1913 the United States ceased to rely upon the tariff as its chief source of revenue (see *Taxation*). The 17th removed a common cause of corruption from state legislatures by providing that United States senators should be elected by direct vote of the people. A postal savings system was established in 1910, and the parcel post in 1912 (see *Postoffice*). Also in 1912 the Children's Bureau was created in the Department of Commerce and Labor; and in the next year this department was divided into two, both heads being made members of the cabinet (see *United States Government*). Treaties for general arbitration with England and France were negotiated, but were lost because of disapproval in the Senate. Taft believed in obligatory arbitration of international disputes. An agreement for reciprocity with Canada, reducing the

tariffs to give special advantages to both countries, was lost because Canada rejected it as an issue in 1911 (see *Laurier, Sir Wilfrid*).

Republican Party Split; Taft Defeated

The Republican factions, quarreling in 1909 and 1910, lost control of Congress in 1911, and in 1912 disputed over the presidential succession. The Insurgents, now better organized, called themselves Progressives, and made every effort to prevent Taft's renomination. They had no leader, however, whose name and fame were powerful enough to promise success. Best known among them was Robert M. La Follette of Wisconsin, who as governor and senator had urged laws to control the trusts and corporations, and had fought the policies of Taft. More prominent as a Progressive, and more useful as a leader, was Theodore Roosevelt, for whom there was a hope of victory if only he could be persuaded to run. The fact that he was sponsor for Taft, and that until after 1911 he took no sides in the party quarrels, made his candidacy uncertain; and he had in 1904 said that two terms were enough. But early in 1912, when the health of La Follette weakened, his supporters turned to Roosevelt. The latter threw "his hat into the ring," and came out for "New Nationalism" and the nomination.

Roosevelt found most of his old associates lined up with Taft, and although he made a stirring fight a majority of the delegates to the convention were pledged to Taft. The Progressives attacked the convention as a corrupt system, urging the "direct primary" for making nominations; and in states where a direct primary existed, the vote showed that Roosevelt's popularity was greater than that of Taft. But Taft was renominated. The Roosevelt supporters left the Republican party, organized the Progressive party, nominated Roosevelt and Hiram Johnson, and entered the campaign fighting for Roosevelt's old slogan of "social justice." Taft was defeated, carrying only Vermont and Utah. Roosevelt had many more popular votes than Taft, but the split defeated both factions, and the Democrats won with a minority of the popular vote (see *Wilson, Woodrow*).

The Ex-President

Taft lived for most of his life on the moderate income of a public officer. He had no great wealth when he left the presidency, and he felt obliged to work. Though he was lawyer and judge by training, he had no connections at the bar; he felt, moreover, that it would be wrong for him to appear as a lawyer before judges whom he had himself appointed while president. He lectured for a while, and soon moved to New Haven, Conn., to be professor of law in Yale University. The bitterness of the fight of 1912 faded away, and gradually, the ex-President's views on public questions became welcome and respected. In particular, his views on peace and the use of arbitration as a means of preventing wars agreed with the spirit of the time. The United States was about to celebrate a century of unbroken peace with England.

Andrew Carnegie was building a palace for the court of arbitration at The Hague, and launching his Endowment for International Peace in Washington.

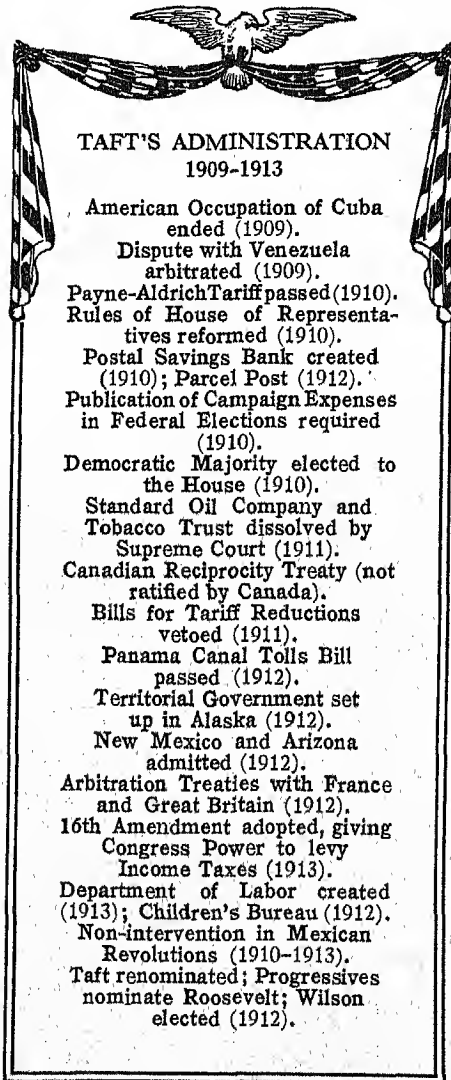
The outbreak of the World War in 1914 found Taft free from the responsibilities of government and identified with the movement for world peace. Whereas Roosevelt in the next two years preached preparedness, Taft devoted his strength and influence to the promotion of a league to enforce peace, which might be created after the war, and be able to prevent another war. President Wilson endorsed the movement in 1916, and in 1917 made its proposal the center of his own policy for ending the World War. The League of Nations, that was incorporated in the Treaty of Versailles in 1919, owed much to the advocacy of Taft.

Taft continued his work for peace after the United States entered the war, but more definite duty was found for him in war work. In 1918 it was necessary to create a National War Labor Board. At first the production of tools of war, of ships, and of clothing for the men was much delayed by disputes over working conditions and the rate of wages. The National War Labor Board became a supreme court for labor disputes, and Taft became one of its two joint chairmen.

The last public service of the ex-President began when President Harding in 1921 named him to the post he had long coveted, chief justice of the United States, to succeed Edward D. White. He was never regarded as one of the greatest lawyers to sit upon the Supreme Court, but he was sound and wise. Those who had in 1912 deserted him, thinking him standpat and reactionary, were agreeably surprised at the liberality and progressive quality of his decisions. He resigned the chief justiceship only a month before death took him, March 8, 1930.

TAILOR-BIRD. Without needle, thimble, or even hands, this little bird of Asia is an expert seamstress. She uses her bill as a needle, with thread if she can find it, if not, with bits of fiber or grass; and she sews leaf-edges together into a wonderful sack. This she fills with wool, fibers, and hair to make a soft nest for her young. Tailor-birds are singers. They

are small, with olive-green plumage above, and yellowish white beneath; the head is marked with a touch of chestnut. They are natives of India, Ceylon, southern China, and the Philippines. Scientific name, *Orthotomus sutorius*.



TAFT'S ADMINISTRATION 1909-1913

- American Occupation of Cuba ended (1909).
- Dispute with Venezuela arbitrated (1909).
- Payne-Aldrich Tariff passed (1910).
- Rules of House of Representatives reformed (1910).
- Postal Savings Bank created (1910); Parcel Post (1912).
- Publication of Campaign Expenses in Federal Elections required (1910).
- Democratic Majority elected to the House (1910).
- Standard Oil Company and Tobacco Trust dissolved by Supreme Court (1911).
- Canadian Reciprocity Treaty (not ratified by Canada).
- Bills for Tariff Reductions vetoed (1911).
- Panama Canal Tolls Bill passed (1912).
- Territorial Government set up in Alaska (1912).
- New Mexico and Arizona admitted (1912).
- Arbitration Treaties with France and Great Britain (1912).
- 16th Amendment adopted, giving Congress Power to levy Income Taxes (1913).
- Department of Labor created (1913); Children's Bureau (1912).
- Non-intervention in Mexican Revolutions (1910-1913).
- Taft renominated; Progressives nominate Roosevelt; Wilson elected (1912).

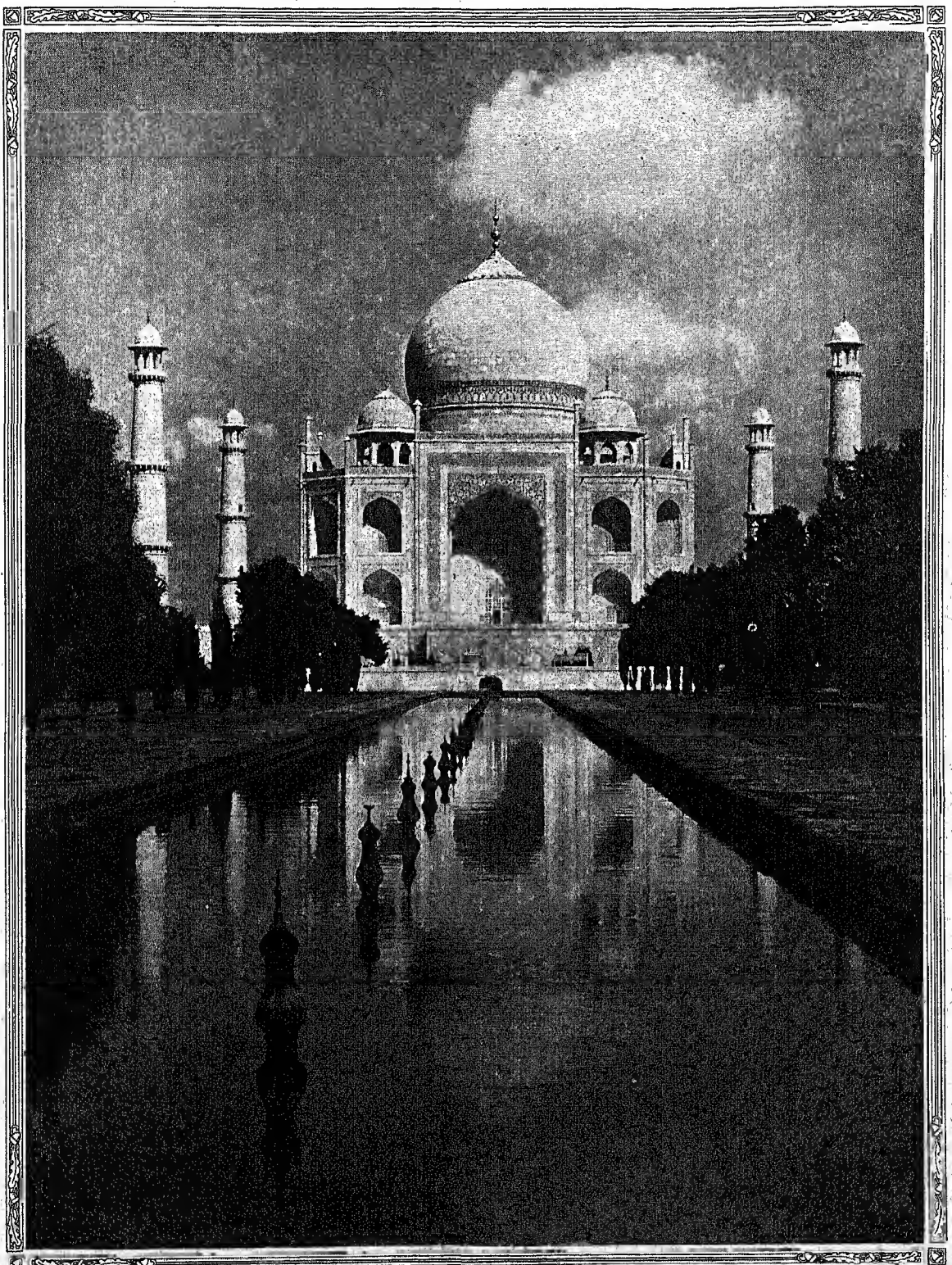
TAJ MAHAL (*tāzh mā-hāl'*). The Taj Mahal, one of the most beautiful buildings in the world, was built by the Mogul emperor Shah Jehan at Agra, near Delhi, India, as a tomb for his favorite wife. When the Moguls came to India in the early 16th century they brought their Persian civilization with them. Persian was the court language, while the arts, especially gardening, were truly Persian. Thus it is natural to find the Hindu architects and artisans building in the Persian style for their conquerors. For its erection a vast army of Hindu workmen labored constantly for 22 years, and the Taj, with its neighboring palace and mosque, is reckoned to have cost between \$20,000,000 and \$50,000,000.

A beautiful story, preserved in the pages of a Persian manuscript, tells how the plans for the Taj Mahal were drawn from a dream which the empress had, and which she described to her husband. He sought throughout all India for an architect who could draw plans from her description, but in vain. Then one day an old religious man appeared before the emperor and said, "I can help you to obtain what you seek." To one of the architects he offered a mysterious drug, saying, "Drink!" And lo! before dazed eyes the wondrous mon-

ument was revealed in all its glory. Feverishly he worked, under the spell of the magic drug, until the plan was finished to its last detail. Then he fell back exhausted.

Whether this story be true or not, the Taj Mahal is a monument of wondrous beauty. It is of white marble, 130 feet long and wide, and nearly 200 feet high to the top of the huge dome, which grandly lifts itself from the eight-sided building. This is flanked on each side by two slender minarets, the whole fabric standing on a platform of red sandstone overlooking the river Jumna. It is surrounded by Persian gardens, such as the Mogul emperors laid

A BEAUTIFUL DREAM IN MARBLE



Whether or not the Taj Mahal was, as the legend says, planned from a dream of the empress in whose memory it was erected, it is not only the most beautiful tomb in all the world, but one of the world's most famous works of architecture. Its name means "gem of buildings," and like a precious jewel it has an exquisite setting. Stately gardens surround it and quiet pools reflect the pure beauty of its majestic dome and slender minarets.

out in their summer capital in Kashmir. One of the most interesting sights in India, next to viewing the snow-clad Himalayas on a clear day, is to see the Taj Mahal under the brilliant Indian moonlight, when it resembles a fairy citadel.

Inside, under the great echoing dome, are the cenotaphs or false tombs of Shah Jehan and his empress. The sunlight filters into this chamber, through marble screens intricately wrought and as delicate as lace, lighting up the jeweled cenotaphs. Everywhere the walls of the interior are covered with the floral designs loved of the Persians, picked out in onyx, jasper, carnelian, and other semiprecious stones cunningly let into the white marble walls. Inscriptions from the Koran, the sacred book of the Mohammedans, are ornately carved in Arabic characters. The real tombs of the royal pair are side by side in the vaulted chamber below, and devoid of ornament.

TALC (*talk*). The principal substance in that soft creamy powder that feels so cooling and soothing after an afternoon at the "old swimming-hole," or after a close shave, is talc. It is one of the softest mineral substances known, the hardness of other minerals being determined by comparison with it.

Talc is magnesium silicate containing a little water. It breaks up easily into thin transparent flakes which are gray, silvery, or greenish-white with a pearly luster. It hardens a little on exposure to the air, is not harmed by high degrees of heat, and holds heat well.

The finest quality, used in talcum powders, electric insulators, and gas tips, is imported largely from England, Italy, and Bavaria. Under several names—steatite, soapstone, potstone, and French chalk—the low and middle grade qualities are quarried in large quantities in New York, Vermont, New Hampshire, Massachusetts, Maryland, Virginia, North Carolina, and California, and ground in mills.

In solid masses, talc is easily carved, for even a fingernail will make a line on its soft greasy-feeling surface. Some of the beautiful blue and green glazed scarabs and amulets of the Egyptians are made of soapstone. The Assyrians made seals and signets of it; the Chinese, ornamental carvings. Primitive peoples hollow cooking vessels from blocks of it.

America produces more than three-fifths of the world's supply and uses even a greater share of the talc or soapstone of commerce. You are familiar with this mineral in the tailor's fine chalk, in slate-pencils, certain foot-warmers, disks for fireless cookers, laundry tubs, sinks, and in the laboratory tables, hoods, and sinks.

TALLEYRAND-PÉRIGORD, PRINCE CHARLES MAURICE DE (1754-1838). To retain the position of foreign minister of France under the three widely different governments—the Directory, the Napoleonic Empire, and the restored Bourbon monarchs—called for tact and diplomacy of an amazing kind. Charles Maurice de Talleyrand-Périgord possessed

not only these qualities but others also which made him one of the foremost diplomats of Europe. His early training for the church gave a keen edge to a naturally brilliant intellect. His intercourse with Mirabeau had taught him the foundations of statesmanship. And a stay in England (1792-94) and America (1794-95) had widened his political vision.

Talleyrand was the eldest son of a French nobleman, but he had been disinherited on account of a lameness caused by a fall from a chest of drawers when four years old, which injured his back for life. Debarred by this defect from the army, he prepared for the church. Talleyrand was too independent to stand well with the authorities, and it was not until 1789 that his executive ability brought to him the appointment of bishop of Autun.

At this time all France was a-buzz with excitement over the approaching meeting, after 175 years' disuse, of the Estates-General, the legislative body of France. Shortly after his appointment, he was chosen by the clergy of his district as their representative in that body. There he joined the liberal clergy in working for reforms, but because he supported the Revolution in its conflict with the church (*see* French Revolution) he was excommunicated by the pope.

Talleyrand was too able a statesman to approve of the excesses committed by the radical leaders of the Revolution. To avoid danger to himself, this disinherited noble and excommunicated priest finally took refuge, first in England and later in America. When the Terror was at an end and order once more restored under the Directory, he returned to France (in 1796) and became in a short time minister for foreign affairs. He clearly saw, however, that Napoleon Bonaparte was master of the situation, and attached himself to the fortunes of that aspiring general. He aided Bonaparte in overthrowing the Directory and in establishing his own power, and in return was reappointed minister of foreign affairs. But his imperial master kept the control of relations with other nations largely in his own hands, and Talleyrand's power was not so great as his title would indicate. At length perceiving that Napoleon's ambition would eventually overreach itself, and fearing for the welfare of France, Talleyrand resigned his position and began plotting for the emperor's downfall.

When Napoleon was overthrown by the Allies, in 1814, Talleyrand urged that the Bourbons be restored; and when this was done he again became foreign minister under Louis XVIII. The most difficult task of his life was now before him—to revive the power and influence of defeated France in the Congress of Vienna. The Allies were determined to impose harsh terms on that country; but Talleyrand skillfully took advantage of quarrels among them, and by the close of the Congress, in 1815, France again occupied an important place in the family of European nations.

As soon as he had accomplished this, Talleyrand resigned his position. After the Revolution of 1830, the new king brought in by that movement, Louis

Philippe, offered him the place again as minister for foreign affairs. He preferred, however, the position of minister to England, where he rendered the last of his great services to his country.

Talleyrand was the embodiment of intrigue and secret diplomacy, and his career was marked by many acts of treachery to those who trusted him. But throughout ran two consistent principles—love of France and support of constitutional liberty. No Frenchman of that time did more to repair the damage wrought by reckless fanatics and senseless autocrats. During his last days he signed a paper of reconciliation with the Catholic church and regret for many of his early actions.

TAMARIND. The rare beauty of the tamarind, as well as the commercial value of its pods, leaves, and timber, has led to its extensive cultivation in the tropics. The tree reaches a height of from 70 to 80 feet, has widespreading branches, clothed in light green foliage, and brilliant clusters of purplish or orange-veined flowers.

The curved brown-shelled pods, three to six inches long—also called tamarinds—are filled with an acid juicy pulp. Packed in casks they are shipped from the East and West Indies to European countries, where the pulp is used as a laxative, and in making beverages and sherbet. Boiled in sugar they become the preserved tamarinds of commerce. In India the seeds of the pod and the leaves are used in making a red or yellow dye. The tree produces a fine hard wood which is valuable in cabinetwork.

Eastern tropical Africa, from Ethiopia southward to Zambezi, is generally believed to be the original home of

the tamarind. It has long been cultivated, however, in many other tropical countries. In the United States it is cultivated most successfully in Florida.

The tamarind belongs to the pulse family, *Leguminosae*. Scientific name, *Tamarindus indica*. Leaves small, pinnate. Fragrant flowers clustered in terminal racemes; 4 sepals, 3 petals, 3 curving stamens.

TAMMANY. Organized shortly after the close of the Revolutionary War as a non-political patriotic and benevolent secret society, with the care of the widows and orphans of Revolutionary soldiers as one of its special objects, the Tammany Society has become notorious as perhaps the most powerful political "machine" in the world.

It was founded in New York City in 1789 by William Mooney, an ex-soldier. Its name was taken from that of Tamanend, a chief of the Delaware tribe, and Indian symbols and ceremonies were largely used in its ritual. Its meeting place was leased to a political organization which came to be known as "Tammany Hall," and practically identified with the society itself. In 1800 Tammany first took an active part in a political campaign, being instrumental in carrying New York for Jefferson; and from that time, working within the Democratic party, it has exerted a powerful influence on the political history of New York City and State, and even of the United States. When in 1871 the corruption of its "boss," William M. Tweed, and his notorious ring was exposed, its reputation suffered severely. In spite of opposition within and without the Democratic party, it still wields great power through its strong organization and through the charities, entertainments, and other means by which it appeals to the people.

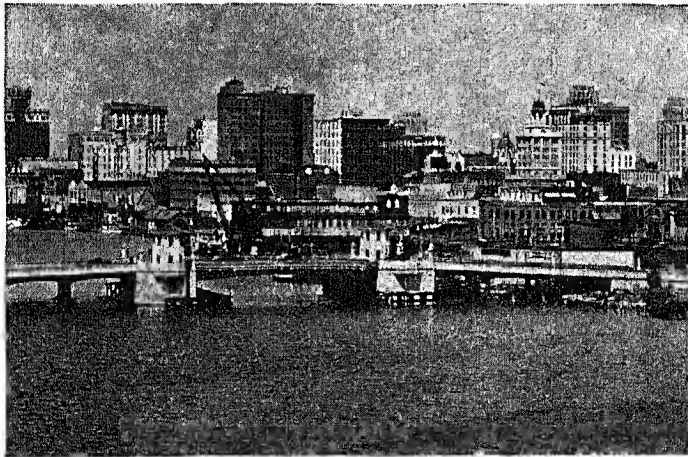
TAMPA, FLA. Once a year a gaily decorated ship, manned by a crew as picturesque as the buccaneers of the old pirate José Gasparilla, sails into Tampa Bay. It is the Gasparilla Carnival, which Tampa celebrates every February to recall the days when pirates had their secret haunts in the harbor.

Tampa lies at the head of Tampa Bay at the outlet of Hillsborough River on the west coast of Florida. This beautiful city grew up from an army post established by the United States in 1823, during the war with the Seminole Indians. In 1898, American volunteers for the Spanish-American War sailed from Tampa's harbor to Cuba. Today this city is Flor-

ida's largest manufacturing and shipping center, and the third largest city in the state. Located 30 miles from the Gulf of Mexico, it is the nearest important harbor to the Panama Canal, the completion of which doubled the city's shipping. A network of railroads links Tampa with other cities. Gandy Bridge, a concrete structure six miles long, connects the city with St. Petersburg across the bay.

Tampa is the cigar capital of the world. The Latin section of the city, called Ybor City, is lined with shops and cigar factories, and about 1,500,000 Havana cigars are made daily. One of the largest phosphate beds of the United States underlies Hillsborough County, and Tampa ships more phosphate

SKYSCRAPERS OF TAMPA, FLORIDA'S BUSIEST CITY



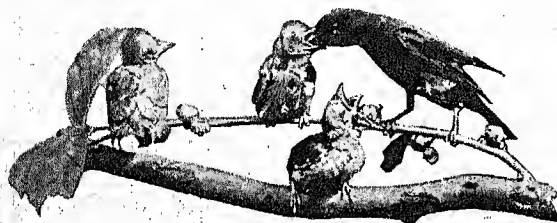
Towering hotels and office buildings mark the Tampa business section. This view is taken from the balcony of a house on an island in the bay.

than any other city in the country. Other products are cement, boxes, fertilizer, canned grapefruit, and tin cans. The city is the wholesale center for 18 counties and ships great quantities of vegetables and fruits. The tourist trade is a chief source of revenue, since the mild climate (mean annual temperature, 71.8° F.) attracts thousands of winter visitors.

The city was incorporated in 1885. It supports a university, the University of Tampa, founded in 1931. Population (1940 census), 108,391.

TANAGER. The bird world has nothing more brilliant than the dazzling red and black plumage of the male scarlet tanager; and no greater sex contrast than that furnished by the plumage of the female, who in dull olive-green is quite inconspicuous compared to her handsome and idle mate.

The tanagers are an American family, found most abundantly in South America. The different species



It took a good deal of patience and skill to get a snapshot of this mother Tanager feeding her young, for these birds are very shy. Mother is here giving one of the babies either a nice fat caterpillar or a berry, for those are the principal items on the Tanager menu.

do not vary greatly in size, being about six or seven inches long; nor in habit, for they all feed on insects and fruits, build a saucer-shaped nest on a horizontal tree branch, and lay from three to five eggs. The song is really not much more than a very musical call. The species which are found in temperate regions during summer migrate south for winter.

Four species are found in the United States; of these the scarlet tanager is the best known. Its body is the most brilliant red imaginable, and the glossy black wings and tail make it a study in color combination. (For illustration in colors, see Birds.) During summer it is found throughout temperate North America east of the Rocky Mountains. The Western tanager, a somewhat larger bird, occurs from the Rocky Mountains to the Pacific coast. It is red only over the head, the body, wings, and tail being yellow mixed with black. Scientific name of scarlet tanager, *Piranga erythromelas*; Western tanager, *Piranga ludoviciana*.

TANEY (*tā-nē*), ROGER BROOKE (1777-1864). The fifth chief justice of the United States Supreme Court, Roger Taney, succeeded John Marshall in this important post, and continued the work of that renowned jurist in interpreting the Constitution and establishing the powers of the Supreme Court over the constitutionality of national and state laws.

Taney was born in Calvert County, Md., March 17, 1777. He graduated at Dickinson College of Carlisle,

Pa., and studied law at Annapolis. He served in the Maryland state senate (1816-21) and was attorney-general of Maryland when he was appointed attorney-general of the United States by President Jackson in 1831. When, in 1833, President Jackson wished to transfer treasury funds from the Bank of the United States to state banks, he made Taney secretary of the treasury to carry out his plans, and in 1836 he appointed him chief justice. There was strong opposition in the Senate to both nominations and the former was never confirmed.

Among the most important decisions handed down by Chief Justice Taney were those in the Dred Scott case (see Dred Scott Decision), and in the Merryman case, the latter denying the right of the president to suspend the writ of *habeas corpus* (see Habeas Corpus).

TANGANYIKA (*tān-gān-yā'ka*), LAKE. Its name signifies "the meeting place of the waters," and Lake Tanganyika in Central Africa is one of the largest fresh-water lakes in the world, more than 400 miles long, over 4,000 feet deep, with an area of 12,700 square miles. It stands about 2,700 feet above sea level. The lake separates the British Tanganyika Territory from the Belgian Congo on the west, and its south shore is in Rhodesia, controlled by Great Britain. Burton and Speke discovered Lake Tanganyika in 1858, and Stanley found Livingstone at Ujiji, the principal town on the lake. Near Ujiji is Kigoma, terminus of the railroad which the Germans finished from Dar-es-Salaam, on the Indian Ocean, across German East Africa (now Tanganyika) before the first World War. The scenery about this vast lake is varied and beautiful. Here the typical vegetation of East Africa meets and mingles with the great central forests. The slopes of the surrounding mountains are richly wooded, the principal tree being the *mvule*, from which the natives make dugout canoes. In the clearings along the shore stand the huts of these savages, who cultivate the rice, yams, and sugar cane, which thrive in the fertile soil. The people are mostly of the Bantu negro type.

The lake abounds in animal life. The crocodile and the hippopotamus frequent the many inlets and numerous species of fish can be caught. The earliest traders were Arabs from the east coast. They left little impression upon the virgin wilderness. Today, however, the Tanganyika hills resound to the throb of steamers carrying the commerce of civilization.

TANGIER (*tān-jēr*). White cliffs circling a shallow blue bay—this is the port of Tangier, gateway to Morocco, in North Africa. Its position on the African side of the Strait of Gibraltar, at the western entrance of the Mediterranean Sea, gives this small Arab city great commercial and military importance. Hence four European nations in 1923 made the city and the surrounding area an international zone of 225 square miles, without forts or army, guaranteed to be neutral in case of war. No one nation was to be allowed to gain possession of this zone.

Tangier is believed to be the oldest city in North Africa. Moroccan Arabs built the city, with narrow

streets twisting up terraced cliffs. Moorish houses and mosques and minarets look out over the bay. The entire zone has about 80,000 people, chiefly Moors. Europeans and native Jews are also numerous. About 45,000 people live in the city. It exports leather, eggs, and canned fish, and imports foods and textiles.

Under the Tangier Statute of 1923, as amended in 1928, the international zone was governed by an international commission of France, Spain, Great Britain, and Italy. In 1940, when war in Europe disrupted the work of the commission, Spain occupied and annexed the zone. (See also Morocco.)

TANKS. Imagine a modern battlefield with attackers and defenders alike hugging their trenches, while cannon pound and zipping machine-gun bullets fill the air. Suddenly there comes a new sound—the clatter of metal and the roar of motors. Then a score or more of steel monsters burst into view, leaping ditches, crushing through barbed wire, and spitting fire from machine guns and light cannon as they come.

These rolling steel fortresses are *tanks*, the modern descendants of the original slow, clumsy British machines which assailed the startled Germans in 1916 during the Battle of the Somme (for picture, see World War of 1914-1918). They were devised to crush barbed-wire entanglements and withstand the withering machine-gun fire which had made infantry attacks all but impossible. The name "tank" had been used during the time the machines were developed, in order to keep spies from suspecting their true nature.

These first tanks, like all later ones, could cross rough or muddy ground, and even trenches and ditches, because they used an American invention, the *caterpillar tread*. This was a continuous band of linked metal plates, placed around wheels and attached to them by cogs. The band supported the tank at all times, while the wheels rolled along it.

Light tanks weigh from 8 to 12 tons, and carry perhaps two .30 caliber machine guns and one of .50 caliber. They travel at from 20 to 30 miles an hour across rough ground, and 50 miles or more an hour on good roads. They fight enemy infantry, cavalry, and machine guns. Medium tanks weigh from 16 to 20 tons or more, and carry light cannon up to nearly 2-inch bore, as well as machine guns. Heavy tanks may weigh as much as 70 tons, and carry 75 mm. (3-inch) cannon or even heavier guns. Such tanks attack fortified positions, other tanks, and artillery.

Defenses against tanks have kept pace with tank development. The best defense is the "tank destroyer"—a motor-mounted, high-velocity cannon of about 3-inch caliber. Guns of 37-mm. (1½-inch) caliber or more are useful against light and medium tanks. Tanks can also be checked by "tank traps," such as steel rails upended in concrete or wide ditches, with sides too steep and high to give caterpillar treads a grip.

TANNHÄUSER (*tän'hoi-zër*). According to an old German legend, Tannhäuser was a knight who, after many wanderings, came to the Venusberg (the moun-

tain of Venus) and entered the luxurious cave-palace of Lady Venus and her court. Charmed by the wonders which he beheld, he remained and abandoned himself to sensual pleasure and revelry. At last, overcome with remorse, he went on a pilgrimage to Rome and craved forgiveness of the pope. Holding a wand in his hand, the pope told Tannhäuser that he could as little get God's forgiveness as that dry wand could become green again. In despair the knight went back to Lady Venus in the mountain. But three days afterward the pope's wand began to sprout and put forth green leaves. The pope at once sent messengers to every land to call Tannhäuser back, but in vain—he could nowhere be found. Such is the story as told in the popular ballad once sung over all Germany, and used by Wagner in his well-known opera 'Tannhäuser'. (See Opera.)

There actually lived in Germany in the 13th century a knight by the name of Tannhäuser. He was a minnesinger, that is, a poet who wandered about singing love songs, as was the custom in those days. Because of his adventurous life, he came to be identified in the imagination of the people with the knight of the legend.

TANTALUM. The fine, rare, white, metallic element tantalum is used for making special laboratory apparatus, instead of platinum, which is much more expensive; and for making surgical instruments and special tools. Sometimes the tantalum is alloyed with aluminum or nickel. The filaments of electronic tubes are often made of tantalum (see Electronics). Important tantalum ores are columbite and tantalite, found chiefly in Australia and South Dakota.

TANTALUS. Do you know what the word "tantalize" means? It comes from the name of a king noted in Greek myth for the punishment he received after death. Tantalus was the son of Zeus, and for making known the counsels of his divine father, or for other reasons—the stories differ—he was stricken with a fearful thirst and had to stand up to the chin in a lake, the waters of which escaped him whenever he tried to drink. Clusters of luscious fruit hung over his head but missed his grasp whenever he reached for them; at the same time he was in terror lest a huge rock, hanging over his head and ever threatening to fall, should crush him. It is from this story that we get the word "tantalize," meaning to tease or hold out hopes that cannot be realized.

TAPESTRY. The interior walls of the castles of the Middle Ages were usually unfinished surfaces of rough stone. To relieve the gloominess, they were sometimes covered with paintings directly on the walls themselves, and sometimes hung with various materials, of which the most prized were tapestries—heavy fabrics in which elaborate designs or pictures were cunningly woven. The walls of many churches and princely palaces were completely covered with wonderful tapestries hanging loosely from hooks. Beautiful pieces were hung from balconies and windows to decorate the streets on parade days, tourna-

ment fields were gay with them, and even on the battlefields they enriched the tents of the great warriors. Great personages often had several sets for their walls. The fact that Mary Queen of Scots had the best hangings removed and an older set put in place in the room in which Darnley was killed, only a few days before he was murdered, was used as circumstantial evidence against her.

The weaving of these beautiful fabrics requires so much skill that it takes 12 or 15 years to develop a first-class workman. The heavy undyed warp threads, usually of hemp, are attached to two long poles, and stretched tight until they are like the strings of a harp, except that they are much closer together—22 or 26 to an inch. Then they are wound around one of the poles until only a few inches remain open between them, and as the work proceeds the finished fabric is wound on the other.

The pattern is usually made with colored wool threads, although occasionally gold or silver threads are used to give added richness. Silk is used in China. With a *broche*, an implement something like a shuttle or bobbin, the workman weaves the colored threads over and under the warp threads so closely that the latter are completely hidden, being marked only by horizontal ribs. Since each *broche* carries only one color, and since several different colors are used for nearly every square inch of a complicated design or picture, you can readily see how tedious the process is.

Sometimes the pattern or cartoon which the tapestry-maker is following hangs on the wall before him. Then his loom stands upright and the finished work is known as *haute-lisse* (literally, "upright warp"). Sometimes the loom lies horizontally over the cartoon itself and the worker follows the pattern just beneath; then the tapestry is known as *basse-lisse* ("horizontal warp"). The work in both cases is done entirely on the wrong side, and in horizontal looms the weaver does not see his design from the right side till the whole is finished. The process is so slow that it sometimes takes a workman a year to do a square yard of tapestry in which there are many figures.

The art of tapestry-weaving dates from the beginning of civilization, but the oldest existing tapestries are found in Egypt, some discovered in the neighborhood of Thebes dating back to about 1400 B.C. The oldest existing mural tapestries were woven in the 11th or 12th centuries A.D. The famous Bayeux tapestry, which is preserved in the Bayeux library in France, is not a tapestry at all, but fine embroidery (see Textiles and Embroideries).

The tapestries dating from 1483 to 1515 are generally considered the greatest achievements of the weaver's loom from the standpoint of pure art. During these years the industry was a very great one, hundreds of thousands of workmen being employed, and the greatest artists of the day supplied the cartoons or drawings. Flanders, under the dukes of Normandy, surpassed all other countries. Tournai, Brussels, and Arras were the great centers; indeed,

the classical name for tapestry is "arras." Almost every country still produces some tapestry. Among the most important works are the celebrated Gobelin looms in France, established about 1601. Imitation tapestries are extensively produced by Jacquard machines. (See Spinning and Weaving.)

TAPIOCA. The hard white tapioca grains that swell up and become soft and translucent when we cook them for puddings come from the roots of the cassava, or manioc, a plant native to tropical South America. Most of the world's supply of tapioca comes from Java and British Malaya; but the cassava is now grown for local use throughout the tropics, where flour made from the roots is a staple food of the people.

The cassava is a semishrubby plant from five to nine feet high. Its thick fleshy roots, which may be three feet long and weigh 30 pounds, are filled with a milky juice. Two species, the sweet and the bitter cassava, are used for food, but the latter is the important species commercially. Its root contains a poison (prussic acid) under the skin, which must be thoroughly washed out.

The plant is raised from cuttings from the stalks of the previous season, and enormous crops are produced with little or no attention. The roots, about 20 per cent starch, are pulped and washed through a sieve with a stream of water which carries with it the starch particles. After the starch has settled into a cake of wet flour in tanks, it is further washed and ground. To form tapioca, the cassava flour is moistened and dried on hot disks or plates. Pearl tapioca is formed by dropping the flour through perforated sheets before drying. The starch is also made into glue, gums, and other substances which are useful in industry. The milk, with the poison expelled by heating, is made into a delicious sauce called cassareep. The roots are ground into gapek meal, a cattle food.

The cassava belongs to the family *Euphorbiaceae*, which includes the castor bean. Scientific name of bitter cassava, *Manihot utilissima*; of the sweet cassava, *Manihot alpi*.

TAPIR (*tā'pēr*). A clumsily built animal related to the rhinoceros and the horse, the tapir forms with them a special group of odd-toed ungulates, or hoofed animals; for all other hoofed animals have an even number of toes. The tapir has three toes on the hind feet and four toes on the fore feet, but only three of the latter are used. There are several species of tapir, all having thick skins and a nose and upper lip drawn out to form an elongated snout or short movable trunk.

Tapirs are found in India, the adjacent Malayan islands, and Central and South America. The Old World tapirs are larger than those of the New World, the common Indian form being eight feet long and 39 inches high at the shoulders. The legs and the fore part of the body are black, but the sides and back are white. Those of the New World are brown or blackish when adult. The common South American form is about seven feet long, and inhabits thickly wooded districts. In the Andes it is replaced by a

THE LIFE OF DIANA TOLD IN TAPESTRY



This beautiful specimen of Beauvais tapestry, "Portière de Diane," is to be seen in one of the famous galleries of the Louvre in Paris. The design is symbolic of Diana, goddess of the hunt. With what ingenuity and skill the artist has combined the figure of the goddess herself with the various emblems of the chase! There you see the maiden-huntress, in one place with her bow, in another with her spear, and in the center preparing for the chase, while her attendants tie the sandals on her feet. In other parts of the design you see the quiver, the arrows, the hunter's net, the hunting dogs, a deer's head, the hunter's horn—and even then we haven't named them all. A beautiful piece of tapestry like this takes years of the most skilful labor.

mountain variety living at altitudes of 7,000 and 8,000 feet. There are two species in Central America whose habits are little known. Tapirs commonly feed on young leaves, shoots, and fruits. Those of South America are destructive to plantations. They are hunted for their flesh and hides. Scientific name of Malay tapir, *Tapirus indicus*; common tapir of South America, *Tapirus terrestris*.

TAR. Wood, coal, bones, and other organic substances yield the heavy oily dark-colored liquid called tar when they are subjected to intense heat in retorts closed from the air. Commer-

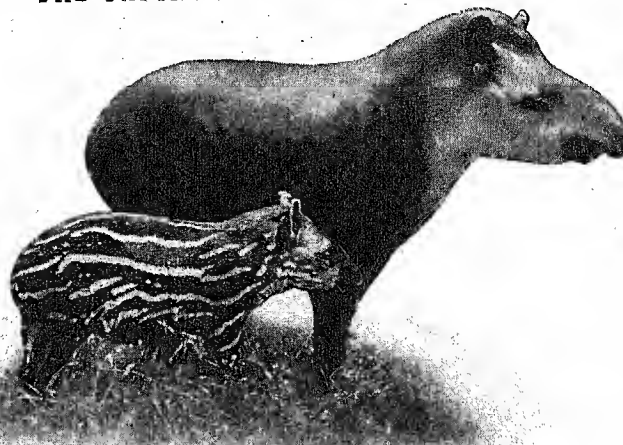
cially there are two chief kinds, wood-tar and the coal-tar which is the source of so many dye-stuffs and other important products (see Coal-Tar Products).

Much wood-tar is produced in northern Europe, known as Archangel tar or Stockholm tar according to the source. In the United States Michigan leads in production. A cord of pine wood produces about 50 gallons. Because of its large creosote content wood-tar is much used to preserve wood and hemp rope. It is also used in medicine, especially in cough syrups, and for antiseptic soaps.

Pitch, which has been used from the earliest times for water-proofing the seams of boats, is the black resinous substance obtained from wood-tar or the non-resinous residue from coal-tar after applying heat to drive out the volatile parts. Pitch is also obtained from petroleum, bone-tar, and stearine residues. The last two are valued by varnish and turpentine-makers. Wood-tar pitch is much used to protect timber from insects and the weather; coal-tar pitch is used in the manufacture of black varnishes,

for coating iron, and for making lamp black. Persia pitch is prepared from goat and sheep dung. Burgundy pitch, produced in Finland, is a drug much used as a medicine.

THE TAPIRS AND THEIR DRESSES



We rather expect to see human children dressed in clothes of a different pattern from their parents, but among animals such a difference in "dress" as you see in this mother Tapir and her offspring is the exception and not the rule. That short trunk you see is very useful to the Tapir, for it conveys food to the mouth, just like the elephant's proboscis.

name "tarantella," applied to an exceedingly lively Italian dance in which the speed increases to the end.

The true tarantula is found only in southern

Europe, but the name is commonly applied to many other large spiders in various parts of the world. One of these, found in the south of the United States, is much larger and more venomous than the largest of the true tarantulas.

These spiders live under rocks and logs, or in deep burrows lined with soft silk which they spin from little silk glands located in the abdomen. They do not spin webs in which to catch their prey, but wait for it like tigers, concealed among leaves or rubbish, or hiding within their burrows. When some unwary insect passes they rush out, bite it, and then drag it into their burrows. The bite either kills the victim at once, or paralyzes it and makes it

helpless. The tarantulas do not chew and swallow the substance of their prey, but suck out the blood and other body juices.

UGH! WHAT AN UGLY SPIDER!



Spiders as a class are not popular, but the Tarantula is particularly disliked. And how quickly it can spring with those long hairy legs and seize its prey! That's why the Tarantula doesn't have to weave a web, as so many spiders do.

What TARIFFS MEAN in the LIFE of NATIONS

TARIFF. Suppose that you are returning to the United States from the West Indies, where you have bought silver jewelry, perfume, and perhaps some wares made of fine woods. On the ship you are given a paper, called a *declaration*, to fill out. You list on it all the articles you have bought and state the price of each. When you arrive, a customs official examines your declaration. All goods up to the amount of \$100 he permits you to bring into the country free, but he charges you a tax, or *duty*, on goods in excess of that amount. Suppose you have to pay a duty on the jewelry. How much will the duty be? The customs officer tells you after consulting a list giving all types of foreign goods on which duty must be paid and the rate on each.

What Is a Customs Tariff?

This list is the *tariff*, a word which came to us originally from the Arabic *ta'rif*, meaning notification. The French word *tarif*, meaning rate, and the Spanish *tarifa*, meaning price list or rate book, came from the same source. In its first meaning, then, a customs tariff is merely a list of foreign articles that are taxed when they are imported or a list of domestic articles that are taxed when they are exported. The term, however, has come to be used not only for the list but also for the duties and for the law in which duties are fixed.

Tariff duties are levied by the government and go into the nation's treasury. They are collected by the Customs Service—in the United States a branch of the Treasury Department—which has offices, called *customs houses*, in every port and in some inland cities. It is, of course, not the small amounts collected from travelers, but the duties on the great quantities of goods ordered by manufacturers and merchants and shipped into a country that make the tariff important in modern governments.

The duty levied may be a fixed percentage of the price of the article, called an *ad valorem* duty; or it may be a fixed amount per pound, gallon, yard, or other unit of weight or measure, known as a *specific* duty. *Ad valorem* duties are usually levied on types of goods that have a wide range of values and qualities, such as textiles, whereas specific duties are better suited to standardized articles, such as sugar.

Tariffs in Other Times

Tariffs have been levied since ancient times. In Greece and Rome both import and export duties were collected. In the Middle Ages cities and feudal lords levied tribute upon any trade passing through their territory. As nations with central governments replaced the feudal system, rulers took this right from the cities and the barons, and not only built custom-houses on all their frontiers, but often charged a tariff on goods passing between provinces. In China, provincial duties, called *likin*, are still collected.

In the early years of the United States, while the new nation was still governed under the Articles of

Confederation (adopted in 1777), states levied tariff duties on goods imported from other states. New York, for example, levied a duty on New Jersey potatoes, and New Jersey in turn charged duties on certain New York manufactures. You can see how trade would be hampered if every state had its own tariff duties. To prevent this, the Constitution provided that no state should place trade restrictions or tariffs on the products of any other state. This provision for free trade among the states has been one of the most important influences in developing a high standard of living in the United States.

Export Duties

In ancient times and in the Middle Ages export duties were more important than import duties. They were levied by European countries both for revenue and as a means of keeping grain and raw materials from leaving the country. By the middle of the 19th century, however, they had almost disappeared from Europe. England did away with them entirely in 1842, and in the United States they were prohibited by the Constitution, chiefly to satisfy the people of the South, who wanted no restrictions on their agricultural exports. In the past export duties have been widely used in non-industrial countries as a source of revenue, but they are no longer considered sound economic practice. A few countries still levy them on certain products. Costa Rica and Guatemala, for example, have an export duty on bananas.

Free Trade and Protection

The two chief purposes of tariffs, on either exports or imports, have been these: first, to procure revenue for the government; second, to protect national industries. Tariffs levied for revenue only are usually kept low, and hence a country with this type of tariff is said to be a *free trade* country. No country, however, really has free trade; in other words, no country admits all imports duty free. Great Britain in the past was a "free trade" country; in fact, it was the only great nation with a tariff for revenue only. When it adopted a free trade policy in 1846, it was so far ahead of other countries in manufacturing that it did not need a protective tariff. After the first World War, however, rising tariffs in other countries caused the British also to set up a protective tariff on many imports.

Free traders believe in charging duties only on goods which cannot be produced at home; or, if a duty is charged on the importation of goods which are also produced at home, they would levy an internal revenue tax on the domestic supply equal to the duty on the foreign product. In this case, of course, the duty would not be protective.

Most economists from Adam Smith, who has been called the "father of political economy," down to the present have favored free trade. They hold that protection benefits chiefly the protected industries and that consumers pay dearly for it in having to pay

a higher price for protected goods. They also point out that a protective tariff interferes with the normal economic process under which industries grow up only in the regions best suited for them.

A protective tariff helps domestic industries by discouraging the importation of foreign goods. If the duty makes an imported article much more expensive than a like article produced at home, most people will buy the domestic product.

Arguments for a Protective Tariff

One of the chief arguments for a protective tariff is that it helps "infant industries" to grow. High tariffs built up many United States industries which could not have survived under foreign competition. The automobile industry, for example, in its early days demanded protection, and a fairly high tariff was levied on imported cars. The infant industry soon grew to giant proportions. American automobile factories became the most efficient in the world, and increasing production made it possible for manufacturers to keep lowering prices. Then the American automobile industry no longer needed high tariffs and wanted to see tariffs lowered all over the world so that it could sell more cars abroad.

Another argument of American protectionists—perhaps their strongest one, now that the country is no longer in the "infant industry" stage—is that a high tariff is necessary to protect American workers from the competition of low-paid workers in other lands. They say that, because of the high wage level in the United States, the country must have a high tariff. Otherwise, cheap foreign goods will pour in, throw people out of work, and lower the living standard. As an example, they point to the importation of articles made by low-paid Oriental labor.

Free traders admit that wages of workers in the Orient are low, and that Oriental countries can therefore produce some articles at a lower cost than it is possible to manufacture them in America. But they point out that the United States, on the other hand, supplies these countries with automobiles, typewriters, sewing machines, many types of machinery, and other items. The United States must either stop sending such goods to these countries or permit them to send in their own manufactures to pay for them.

Again, it is urged that protective tariffs are needed to prevent *dumping*. Large producers sometimes dump their goods, that is, sell them cheaper in foreign markets than at home, either to get rid of a surplus or to kill competition by foreign producers. Most countries have special provisions in their tariff laws to prevent such unfair competition.

An argument that has greatly influenced recent tariff policies in many European countries is that protection enables a country to build up its essential industries and thus enables it to be more nearly self-sufficient in time of war.

Tariff Bargaining

In Europe the practise of tariff bargaining has existed for centuries. That is, nations have made treat-

ties with other nations granting them tariff concessions—lower rates on certain products than the nation's established rates—in return for like favors. When a nation lowered its tariff duties to another nation, the lower duties automatically extended to all nations entitled to "most favored nation" treatment. In the last quarter of the 19th century nations began to include in their tariff laws two schedules of rates, the higher schedule being the regular rate and the lower schedule indicating the amount by which the rate might be reduced in tariff bargaining. Such provisions in tariffs are known as *reciprocity* measures. Sometimes nations inserted in their tariff laws penalty duties—higher than the maximum rates specified—which might be applied to imports from nations that did not make concessions to them.

The United States until 1890 followed a non-bargaining policy, except for a reciprocity treaty with Canada in 1854-65. In the next 20 years provisions were made for obtaining concessions from foreign countries by treaty—notably by a maximum-minimum clause in the 1909 tariff; but little was accomplished, and in 1913 tariff bargaining was abandoned. It was revived in 1934, and really became effective in the United States for the first time when Congress, as a depression measure, gave the president power to make reciprocal trade agreements with other nations. He was permitted to reduce duties as much as 50 per cent below the rates fixed by the 1930 tariff. A number of treaties were soon in effect.

The Tariff and Economic Nationalism

After the first World War there was a growing tendency for nations to try to make themselves economically independent—that is, to produce at home as much as possible of the goods they need and to rely as little as possible on imports from other nations.

One of the chief means used to promote such national self-sufficiency has been the protective tariff. From a device to build up a nation's individual industries by protecting them from foreign competition, it became one of the important devices for controlling a nation's whole economy. Tariff walls became higher and higher—in many cases so high that they prohibited entirely the importation of certain classes of goods. Bargaining became sharper, and a whole host of restrictive measures—some new and some that had been tried in an earlier day—were brought forward by European countries to check imports. Among them were import quotas and licensing measures, barter agreements and prohibitions, and even state monopolies of foreign trade, as well as exchange controls to reduce the funds available for foreign buying. (A further discussion of this problem may be found in the article International Trade under the headings "From Great War to Great Depression" and "Interdependence or Economic Nationalism?")

It is therefore evident that tariff policies have a far-reaching effect that involves not only trade, but the economic and social life of a nation and its coöperation with other nations in the problems of civiliza-

tion. On ideal grounds economists advance many arguments for lowering tariff barriers, but they realize that this is not likely to happen for a long time. Hence they are chiefly interested in furthering the development of scientific tariffs that will provide as little disturbance as possible to the free flow of international trade.

Protection and Free Trade Advocates in America

The tariff has long been a hotly contested issue in American politics. Differences between the North and the South on the nation's tariff policy were a chief cause of the Civil War. In the 19th century opinion about tariff policy was divided largely according to the major economic activities of the various regions. The rising young manufacturing districts of the northeast wanted protection. Textile manufacturers of New England, iron and steel manufacturers of Pennsylvania, and many others who were working largely for the American market wanted a high tariff to keep out English, German, and French goods.

The agricultural South and West, which were exporting cotton, tobacco, wheat, and meat products to Europe, wanted low tariffs in European countries. They also wanted low tariffs in the United States so that manufactured products would be cheap.

The issue has not been so clearly defined by regions or industries in recent years. Much manufacturing that wants protection has moved to the South and West. The textile industry of the Carolinas and iron and steel in Alabama are illustrations of this. Furthermore, some agricultural industries, such as those growing cane sugar in Louisiana, want protection. On the other hand, a number of great manufacturing industries, like the automobile industry, have become so efficient that they want low tariffs the world over. Also, many of the great international bankers in New York and Chicago who have lent large sums abroad would like to see tariffs low enough so that foreign countries could sell goods in the United States and thus get the money to pay interest on the loans.

Tariff policy has been one of the major issues between the country's two great political parties. Historically, the Democratic party has advocated a tariff for revenue only. The Republican party has advocated a tariff for protection. The Democratic administration of the 1930's, however, substituted tariff bargaining, as we have seen, for general tariff reduction in the effort to restore foreign trade.

From time to time there has been agitation for "taking the tariff out of politics." It was hoped that the provision by Congress in 1916 for a nonpartisan Tariff Commission to investigate matters pertaining to the tariff would be a step in this direction. The Commission's reports and recommendations to the president and Congress are a valuable service, but most thoughtful observers doubt whether it can ever function without some political interference.

Tariff Rates and How They Are Collected

The rates on goods imported into the United States range up to 100 per cent or even more. In recent

years from 55 to 67 per cent of all imports have entered duty free. Most such goods are raw materials. In the same years the average rate on goods which are taxed has been about 59 per cent. For many years tariff duties furnished a large part of the revenues of the Federal government—90 per cent before the Civil War and nearly 50 per cent as late as 1913. With new sources of revenue, such as the income tax, import duties have become of minor importance to the national budget; they now furnish less than 10 per cent of the revenue. In fixing rates, therefore, the chief consideration is their effect on economic life rather than their effect on the national budget.

Most of the foreign goods that enter the United States come in by ship. Before they are removed from the ship they are examined by customs inspectors. The duty may then be paid and the goods forwarded to the buyer, or the goods may be transferred to a bonded warehouse and the duty paid when they are removed from the warehouse. Buyers in the interior may pay the duty in their local customs district upon receipt of the goods. The complicated business of making arrangements for paying customs duties and forwarding the goods is usually handled by *customs brokers*, who specialize in this work.

Free Ports or Foreign Trade Zones

Many nations have what are known as *free ports*, *free zones*, or *foreign trade zones* where goods intended to be reshipped to some other country may be landed temporarily without being taxed. The United States in 1934 passed a law permitting corporations to establish foreign trade zones in or near ports of entry. Goods may be brought into these zones without being taxed and may be stored, broken up, repacked, assembled, sorted, graded, cleaned, and so on; but they may not be manufactured before reshipment. The first foreign trade zone under this law was established at Stapleton, on Staten Island, N. Y., in 1937.

History of the Tariff in the United States

The policy of the United States, ever since the first tariff act was passed in 1789, has been generally in favor of protection. A protective tariff was first successfully urged by Alexander Hamilton, using the infant industry argument. Although the 1789 tariff was not high, the preamble to the act stated that one of its objects was to encourage and protect manufactures. Henry Clay urged protection of manufactures as a means of building up a better home market for agricultural products, and a temporary protective tariff was levied in 1816. In the following year, when the internal revenue tax that had been in effect during the War of 1812 was abolished, President Monroe urged a strong protective tariff. The tariff now became a chief political issue. Several protective bills were defeated, but in 1824 Congress passed a bill intended to exclude foreign goods which competed with American manufactures.

The famous "Tariff of Abominations" (1828) was the next protectionist measure. It fixed prohibitive duties on cotton and woolen goods and other products. Southerners, fearing that the high tariff on British cotton imports would lead to retaliatory measures against their agricultural products, protested vigorously. They even threatened to secede. Their opposition led to the Tariff of 1832, which in general restored protective measures to their 1824 status and removed some of the more striking features to which the South objected (*see States' Rights*).

Eventually the so-called "Compromise Tariff" of 1833, sponsored by Henry Clay, was passed; (see Calhoun, John C.). It provided for a gradual reduction of the tariff until 1842, after which all imports were to be taxed 20 per cent. But in that year another high tariff bill was passed, because the depression of 1837-42 had caused a serious decrease in revenue from the customs, and government receipts were insufficient to meet expenses.

By 1846 prosperous times had returned and, with the Democrats at the helm, the Walker Tariff was passed abandoning the protective policy. Low tariffs prevailed until the Civil War. Then, in 1861, the Republicans passed the Morrill Tariff, a distinctly protective measure. Except for some reduction in 1872-74, tariff rates thereafter steadily increased until the Democratic Wilson-Gorman Tariff reduced them somewhat in 1894. The McKinley Tariff of 1890, meanwhile, had reduced duties on a few commodities, but had materially increased them on others.

In the Dingley Tariff of 1897 and the Payne-Aldrich Tariff of 1909 the Republicans restored rates to about the same level as they were in the McKinley Tariff. Duties on many articles were lowered and the free list was greatly increased by the Underwood-Simmons Tariff of 1913, a Democratic measure. Rates were again increased under the 1921 Emergency Tariff. Its chief purpose was to help the farmers, who were suffering from a severe depression, by protecting them from foreign competition. High duties, some of them almost prohibitive, were placed on the importation of about 30 farm products. The Fordney-McCumber Tariff of 1922 was another highly protective law; and rates became still higher in the Hawley-Smoot Tariff of 1930. (See also International Trade.)

TARPON. When a fisherman hooks this great American game fish, it leaps into the air, shaking itself "with all the frenzy of a wild horse when he first feels the lasso." A tremendous fight usually follows, before the fisherman captures his victim.

In general form the tarpon resembles the herring, to which it is related; but it weighs up to 350 pounds and reaches a length of eight feet. Its armor of round, silvery scales, large as silver dollars, has earned it the name "silver king." The tarpon is found in the Atlantic from Virginia to Brazil, and in the Gulf of Mexico. Scientific name, *Tarpon atlanticus*.

TARTARIC ACID. Fermenting grape juice leaves in a cask a hard crust of impure acid potassium tartrate, called argol. Argol, partially purified by dissolving and recrystallizing, is called "tartar"; a final purification that eliminates coloring matter yields "cream of tartar." Some baking powders are mixtures of soda (sodium bicarbonate) and cream of tartar. The two compounds interact when moistened and give off carbon dioxide, which lightens dough.

When boiled with a suitable form of calcium, then treated with sulphuric acid, cream of tartar yields tartaric acid ($C_4H_6O_6$). This is used in medicine, in photography, and in dyeing. It forms various tartrates, or salts. Rochelle salt is sodium potassium tartrate; tartar emetic is antimony potassium tartrate.

Certain puzzling features about tartaric acid led Louis Pasteur, in 1860, to one of his most famous discoveries. Chemists had found that solutions of tartaric acid rotated polarized light to the right, or were *dextro*-rotatory (see Light). A seemingly identical substance, racemic acid, produced no effect on polarized light. Pasteur found that two kinds of

crystals can be obtained from racemic acid. One kind is *dextro*-rotatory and is the familiar form of tartaric acid. The other kind of crystal rotates polarized light to the left (*laevo*-rotatory); it is chemically identical with the familiar form, but its crystals are mirror images of the *dextro*-rotatory ones. In racemic acid, the two kinds of crystals neutralize each other in effect. This discovery founded the science of *stereochemistry*, which studies the effects of a substance's structure upon its physical and chemical properties. Many other substances have since been found to exist, like tartaric acid, in two or more forms which seem chemically identical but differ in the way in which their atoms are arranged in space. Sugars offer good examples (see Sugar).

TASMANIA, AUSTRALIA. The "back of the beyond" was what people used to call the island of Tasmania, tucked away below the southeast corner of Australia. When the Dutch navigator Abel Tas-

THE "TASMANIAN DEVIL"



This strange creature, known as the "Tasmanian Devil," is peculiar to the country from which it gets its name. It is a small marsupial, or pouched animal, with so ferocious a temper that it is absolutely untamable.

nian discovered the island in 1642, he found it a wildly beautiful spot with a rugged coast line and high rough hills, inhabited by a strange black race. But there was little to invite settlers, and no nation attempted to colonize the island until 1803,

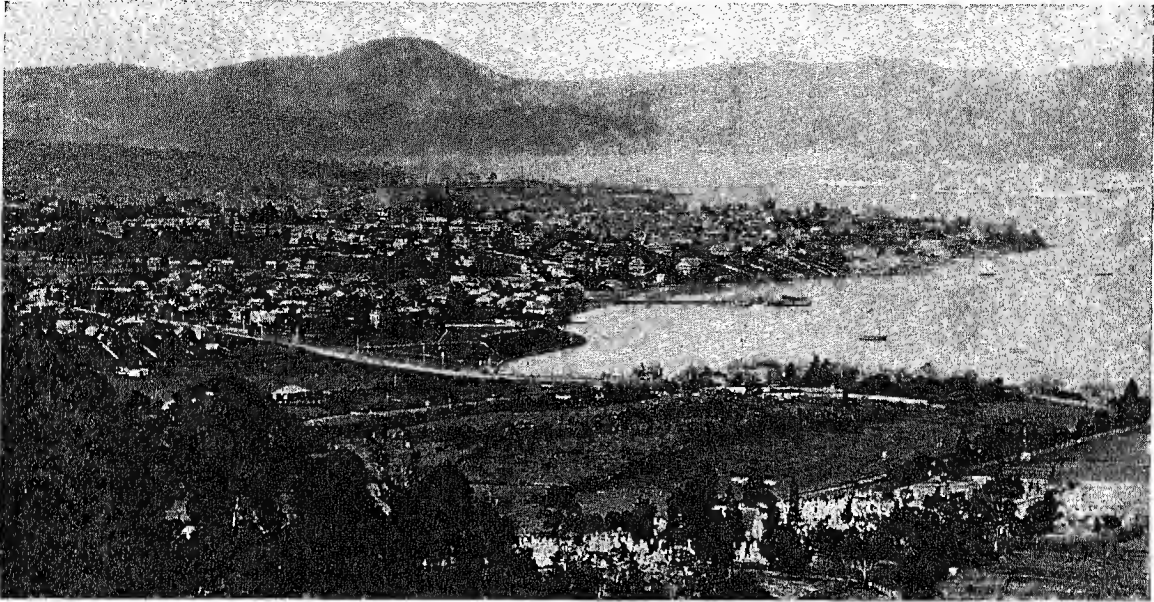
when Great Britain sent out 400 convicts. The following year Hobart was founded.

For the next 50 years thousands of "undesirables" from all parts of the British Empire were shipped to Van Diemen's Land, as the island was then called. The convicts were compelled to work for the few free settlers, and many evils arose. The natives and whites clashed constantly and the "blackfellows" were rapidly exterminated.

In 1853 the importation of convicts was stopped, the name of the island was changed to Tasmania, and the population was granted representative government. But at this period the discovery of gold in Australia lured away virtually all the younger people from the island. It was not until the 60's that Tasmania entered upon a period of sound prosperity.

Tasmania has a temperate and healthful climate. With lovely lakes, many rivers, abundant rainfall, and a fertile soil, the island is well adapted to agriculture. Oats provide the chief crop. On the heavily forested mountain slopes reigns the "blue gum" eucalyptus, one of the strongest, densest, and most valuable woods in the world. Great logs as big as freight cars are hauled along Tasmania's railways to the coast, bound for the farthest ends of the earth. The peaks and ridges which dot the plateau are rich

THE BEAUTIFUL CAPITAL OF TASMANIA



Hobart, the capital of Tasmania, is one of the most beautifully located cities in the world, standing on a series of low hills at the foot of Mount Wellington (the highest peak you see in the background) and fronting on a picturesque bay, opening into the estuary of the River Derwent. The streets are wide and there are numerous parks and public gardens. The harbor is easy to get at and is well sheltered and deep.

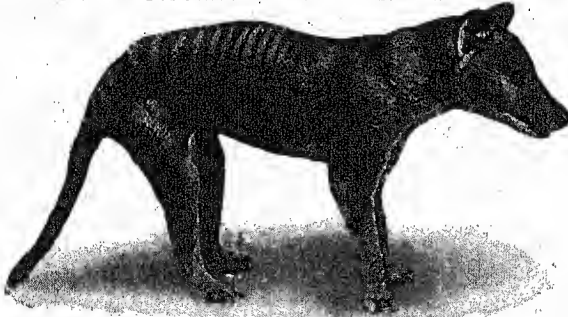
in minerals—copper, tin, coal, gold, silver, lead—and mining is the chief industry. The population centers about the capital, Hobart, one of the most picturesquely situated cities of the southern world.

The animal life is very like that of Australia, but the island has two strange beasts of prey found nowhere else. One of these, the Tasmanian zebra wolf, a striped creature very like an ordinary wolf in shape but having a pouch like a kangaroo for carrying its young, is very destructive to sheep.

The other, the Tasmanian devil, very like a small bear in appearance, is smaller but even more fiercely bloodthirsty. It also carries its young in a pouch on its belly. (See Kangaroo.) Tasmania also has its peculiarities in plants, as well. Among its cone-bearing trees the island has nine species peculiar to itself, and over 250 species of flowering plants which are unknown elsewhere.

Since 1901 Tasmania has been a state of the Australian Commonwealth. The island is heart-shaped, about 180 miles long and 175 miles wide, and has an area, including surrounding islands, of 26,215 square miles. It is separated from Australia by Bass Strait, 140 miles wide. Population, about 230,000.

THE TASMANIAN ZEBRA WOLF



The animals all over Australasia are a queer lot. You wouldn't think of calling this creature a wolf, would you? Look at its stripes, as if it had half a mind to turn into a zebra. Like the "Tasmanian Devil" on the opposite page, the mother Wolf has a pouch for carrying her babies, showing that the animal is related to the Kangaroo.

TASSO, TORQUATO (1544-1595). The story of this great Italian poet reads like a romantic tragedy. He was born at Sorrento in that period of Italian history when the wealth and power of the country was in the hands of many princes or dukes, whose courts were centers not only of luxury but of art and learning. It was the custom at that time for poets, artists, and scholars to attach themselves to the courts of these dukes. Thus their livelihood was assured, but, on the other hand, they were not free to follow their own inclinations and were affected by any change in their patrons' fortune or favor. The father of Torquato Tasso

was himself a poet and had suffered so many ups and downs in his career as a courtier that he decided his son should follow a more certain profession. Accordingly he sent the lad to the University of Padua to study law, but Torquato gave more attention to philosophy and poetry. Before he was 18 he had written 'Rinaldo', a romantic poem dealing with the stories of Charlemagne, which showed such originality that his father was forced to allow him to follow his bent and devote himself to poetry. He went to Bologna in 1563.

After a short period of study at the University of Bologna, Tasso enjoyed five happy years under the patronage of Cardinal Luigi d'Este at Ferrara, where he became a favorite of the most brilliant court in Italy. Later he entered the service of Alfonso, duke of Ferrara, and in his 31st year finished his masterpiece, 'Jerusalem Delivered', a religious epic based on the First Crusade. Instead of publishing it at once, he sent it to a group of scholars and churchmen at Rome for their opinion. They criticised the poem so severely that the sensitive Tasso was driven almost to madness. The jealous courtiers added to his sufferings by slanders and insults, and the poet became the prey of melancholy and irritability that amounted almost if not quite to insanity. One evening in the presence of the Duchess he drew his sword to stab a servant who, he fancied, was spying on him. Gossip said that this state of mind was aggravated by his love for the Princess Leonora, sister of the Duke, to whom he addressed many impassioned lyrics. At last Tasso displayed such violence of temper that the Duke sent him to a madhouse, where he was kept in confinement for seven years. During this time he wrote some of his best short poems and a series of philosophical reflections. Alfonso was finally induced to release him in 1586.

After several more unhappy years, fortune at last seemed to smile on the broken old man. He was invited to Rome to receive at the hands of the pope the poetic crown of laurel—but the honor came too late. Before the ceremony was performed Tasso fell ill and died in the Convent of St. Onofrio.

His chief works are: 'Rinaldo' (1562); 'Aminta' (1573); 'Jerusalem Delivered' (1574); 'Torrismondo' (1586).

TASTE. The sense of taste depends on little projections called "taste buds" located on the tip, sides, and back of the tongue (*see Tongue*). The taste buds contain a special nerve ending from which nerve fibers extend back to the brain.

When any solution or substance capable of dissolving in the saliva is taken into the mouth and comes in contact with the nerve endings, a message is sent back to the brain. Then we say we taste the substance. An insoluble substance has no taste, but may be felt through touch.

We have four kinds of true taste—sweet, bitter, salty, and sour, each with its own nerve endings and fibers. Flavors are fused sensations of taste, smell, and touch, in which odor plays the most prominent part. (*See Smell; Tongue*.) The flavor of vanilla ice cream is made up partly of odor from the vanilla, partly of taste through stimulation of the sweet taste buds, partly of cold through stimulation of the cold spots, and partly of smoothness through stimulation of touch (*see Touch*).

TATARS. "Well may they be called Tartars, for their deeds are those of fiends from Tartarus!" Such, it is said, was the appalled exclamation of the pious king, St. Louis of France, on hearing of the havoc wrought by the Mongol hordes that seethed up out

of Asia in the 13th century; and such, it may be supposed, was the association of ideas that made "Tartars" out of "Ta-ta Mongols." The name of this tribe came to be applied to the whole group of tribes that formed the hordes of Genghis Khan and other Mongol invaders of later times (*see Mongols*), as well as to the kindred peoples they subdued; and the region from which they came, now loosely known as Turkestan, with the neighboring regions they overran, was called Tartary.

The name Tatar today is usually reserved for a group of tribes in Russia and Siberia, numbering about 3,000,000, mostly of Turkish origin and of the Mohammedan religion. Those in Russia are remnants of the Mongol invasion of the 13th century, though they have very slight traces of Mongolian blood or none at all.

TATTOOING. Tattooing, that queer sort of skin decoration found among many half-civilized peoples, is usually done by pricking in designs with an awl or needle dipped in different colors. Some patterns are sewed in by drawing under the skin a thread which has been dipped in color. Others are made on certain dark-skinned races by a process called cicatrization or scar-tattooing. This is done by repeatedly cutting the skin in the same place so that when it heals a raised scar is left. Many African tribes mark their boys in this fashion, rubbing wood ashes into these great gashes on the face or body, which causes swelling and healing with a purple color. In some tribes no girl is eligible for marriage until she has been elaborately tattooed. Sometimes tattooing is done as a mark of courage shown in war or to present a more terrifying aspect before the enemy. Sometimes it has a religious meaning, and again it is a sign of mourning. In Japan, where it was once a high art, elaborate color tattooing took the place of clothing. Even in civilized lands tattooing is occasionally done, chiefly among sailors.

TAXATION. Every government requires money to run it. Indeed, it is possible to think of governments as businesses that are owned by the people and engaged in doing certain things for the people that cannot be done so well by individuals. Building roads and bridges, maintaining public schools and libraries, catching and punishing criminals, and supporting the army and navy are typical examples of government activities.

Governments differ from ordinary businesses in that usually there is no payment made at the time the service is rendered. Instead, the people pay for these public services in the form of various taxes that are paid to the government.

These taxes may be direct or indirect. The best example of an indirect tax is a customs or tariff duty on goods imported into the country. The importer pays the tax to the government and adds the amount—usually with some increase—to the price he charges for his goods. Until 1909 the largest part of the income of the United States government was derived from such tariff taxes.

A direct tax is one that cannot so easily be shifted. The simplest example is the poll tax, levied on persons, not property. The name comes from the Anglo-Saxon word "poll," meaning "head." Poll taxes have always been unpopular since the revolt of Wat Tyler against them in England in 1381. They have been abolished in most of the United States, though they survive in a few states as a qualification for voting. The income tax and the general property tax are other examples of direct taxes.

What Are the Marks of a Good Tax?

Since taxes have always been more or less unpopular, statesmen have attempted to show clearly why people should pay taxes, and on what basis the amount of tax paid should be calculated. About the time that the American colonists were fighting against "taxation without representation," Adam Smith, the famous British economist, stated the requirements of a good tax. In addition to being levied in proportion to ability to pay, he said that the tax must be certain and not arbitrary in amount, that it must be payable in the manner most convenient to the people, and that it must be inexpensive to collect. Colbert, a great French minister of finance, a century earlier had stated his idea of a good tax somewhat differently: "So pluck the goose (the people) as to produce the largest amount of feathers with the least possible amount of squawking."

Income and Inheritance Taxes

The tax which best meets these requirements is the income tax. This has been generally used in Europe for 50 years or more. The United States Constitution, however, provided that any "direct tax" laid by the Federal government should be apportioned among the states in proportion to the population; and the Supreme Court decided in 1894 that this provision prohibited an income tax. Not until the 16th Amendment became a part of the Constitution in 1913 was the way open for the regular use by the Federal government of an income tax, though such a tax had been imposed in 1864 to meet the cost of the Civil War. Many American states also levy income taxes.

Under the income tax system, the amount of the tax is based not on the value of property owned, but on a person's income, after necessary living and business expenses have been met—that is, on *net* income. In a "graduated" or "progressive" tax, a *normal* tax is put on all incomes above a certain level, and a *surtax*, or extra tax, is levied on larger incomes, increasing progressively with the amount of income. A part of all personal incomes, however, is allowed for living expenses, and is exempt from taxation. Both federal and state tax rates and exemptions are frequently changed by act of the legislatures as the need for revenue changes.

Income taxes have become an increasingly important source of revenue. In the United States they now provide a major part of the "internal revenue" of the Federal government, and, although the individual states still lean heavily on property taxes,

needs for increased revenue have impelled the majority of them to levy income taxes.

Business Taxes and Excises

Incomes of corporations are also taxed by the Federal government and by many states. Other federal business taxes are levied on excess profits, undistributed profits, and capital gains. Businesses are subject to many other taxes, such as licenses for permission to operate and payroll taxes for social security benefits. Social security taxes are levied on employees as well (*see* Social Insurance).

Among other direct taxes are the gift tax; the estate tax, which is levied on property left when a person dies; and the inheritance tax, which is put on the shares of heirs and beneficiaries.

Excises make up most of the indirect taxes. These are duties levied on the manufacture, sales, or consumption of commodities, and on occupations, services, and amusements. Taxes on tobacco and alcoholic beverages are examples. As the need for greater revenue has been more acute in recent years, such taxes have been greatly extended. Taxes on gasoline and motor vehicles make up a considerable part of both federal and state income.

Excises are levied on a great variety of manufactured goods, some collected from manufacturers, some from retailers. Sporting goods, luggage, radios, phonographs, home appliances, electric signs, business machines, matches, furs, and jewelry are among such goods. Other examples of excises are the taxes on club dues, admission to amusement places, telephone and telegraph messages, transportation tickets, and safe deposit boxes.

In addition to such special taxes on sales, there are general sales taxes. These may be levied either on the gross business of retailers and other merchants, or on sales to the consumer. The sales tax has been widely adopted, because it is highly productive and is easy to collect, but it is subject to criticism on the ground that it is unfair. It falls most heavily on the poor, who must spend all their income to buy the necessities of life.

Since states may not tax interstate commerce, they cannot tax transactions of their citizens with out-of-state firms. Hence some states collect "use" taxes on articles bought from outside firms.

The General Property Tax

The oldest form of taxation in the United States is the general property tax. For most local governments this is the principal source of revenue. Until recent years it was the mainstay of state governments as well, but now it is only a minor source of state income. It is hard to administer fairly and easy to avoid, and it does not fall equally on citizens in proportion to their ability to pay. For these reasons, and also because of the need for additional revenue, the states now derive most of their revenue from sales taxes, unemployment compensation taxes, motor vehicle and business licenses, and income and inheritance taxes. The property tax is levied on both *real property* (land

and buildings) and *personal property* (such things as furniture, clothing, securities, and money). It is administered by local *assessors*, who list and value each taxpayer's taxable property and compute the amount he is expected to pay.

The operation is as follows: (1) The taxing government determines how much income it will need; (2) the tax levy is divided by the value of all the taxable property; (3) the result is a ratio, which is called the "tax rate." The assessed value of a person's property, multiplied by the rate, gives the amount of tax. There are many objections to the general property tax, chiefly because its inequalities and injustices make "tax dodgers" of many people who are otherwise honest.

Any taxpayer who thinks his property is assessed too high can appeal to a tax court or "board of equalization." If taxes are not paid when they are due, they become "delinquent" and a penalty is added. If, after a certain time, the tax is still unpaid, the property may be seized and sold.

"Unearned Increment" and "Single" Taxes

As a general rule, land increases in value as a district grows in population. The history of a certain quarter of an acre in Chicago, for example, shows that in 1831 it was valued at \$30. A century later, its valuation was placed at \$2,000,000. This increase in the value of land due to the growth of the community as a whole, and not to the efforts of the man who happens to own it, is called by economists an "unearned increment." For a time (1911-20) Great Britain tried to take by taxation one-fifth of such "unearned increment" every time the land changed hands.

Advocates of the "single tax" would go farther and would raise all the revenue needed by the government through a single tax laid on land, exclusive of its improvements. Henry George, a San Francisco journalist, gave this idea its widest circulation in a brilliant book entitled 'Progress and Poverty' (1879). His proposals have been criticized alike by owners of land who regard the plan as confiscatory, and by socialists who object that it does not go far enough. Its opponents argue that it would be unfair to present owners of land, that determination of the value of improvements would be difficult, and that it would not raise enough revenue. A modified form of this tax has been tried in some European countries and in places in the United States, Canada, and Australasia.

TAXIDERMY. If you go into a great museum of natural history today you will find beautiful speci-

MOLDED IN PAPER



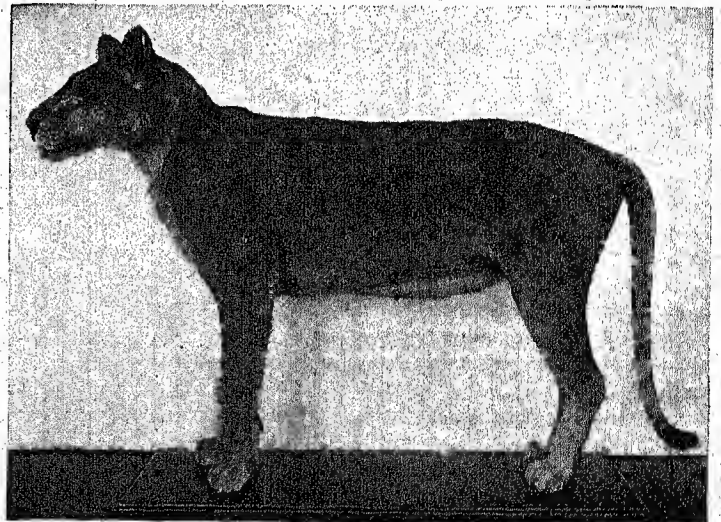
So that a museum monkey will look just as he did swinging in the trees of the jungle, the taxidermist first molds a model with muscles carefully formed as shown here. This monkey is in the papier-mâché stage.

mens of birds, beasts, and reptiles preserved and mounted in natural positions, in the midst of cunningly constructed settings which reproduce the animal's natural surroundings. You see tiny hummingbirds hovering over flower clusters; great cranes asleep amid reeds, one leg tucked close to the body; monsters of the prehistoric period stalking through ferns as tall as trees; a leopard mother asleep in the jungle with her cubs around her; great boa constrictors coiled about tree branches, in wait for the unwary deer as it passes beneath.

Such triumphs of modern taxidermy, or the art of preserving and mounting animals, demand knowledge, skill, and artistic taste. Formerly animal specimens were merely cleaned, skinned, and stuffed; and the result was often little like the living animal. But taxidermy has

now been transformed from a crude handicraft into an elaborate art. To be a taxidermist today one must be familiar with anatomy, zoölogy, sculpture, tanning, dyeing, and painting. The new school has done away entirely with the old "stuffing" idea. Now

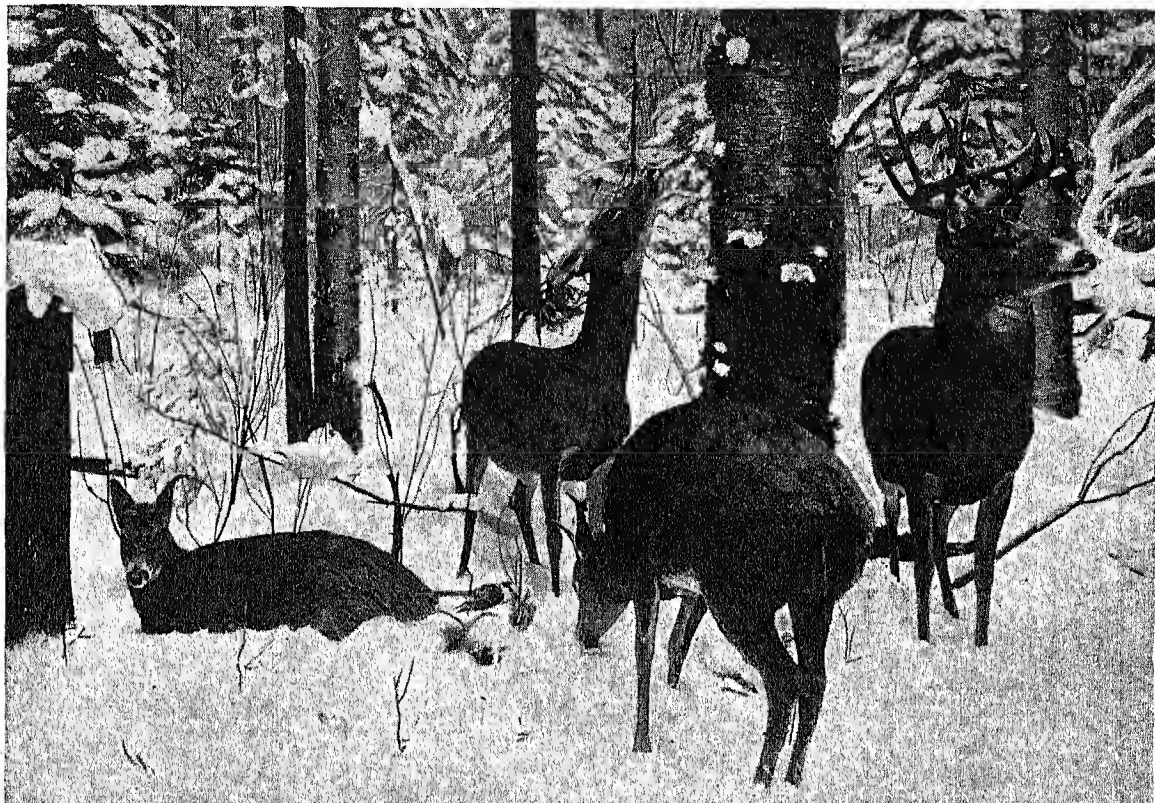
AN OLD-FASHIONED "STUFFED" LION



This "stuffed" lion is a good example of the old-fashioned way of preparing wild animals for museums. If you compare it with the deer pictured on the next page, you will see how much more interesting animal specimens are when realistically reproduced and posed in lifelike attitudes.

the animal to be mounted is carefully studied and compared with living specimens of the same species or with photographs. A framework of wire is covered with clay, plaster, or papier-mâché, and modeled in the desired pose as carefully as if it were a sculptor's model. Even the principal muscles are

A GROUP THAT MIGHT DECEIVE THE DEER THEMSELVES



If you came across this group of deer in the woods in winter time, wouldn't you think that they were alive? And yet they are only deer prepared and grouped by the art of the modern taxidermist, who strives to pose animals as they would appear in their natural surroundings. This group is to be seen in the Chicago Natural History Museum.

indicated. Over this dummy or "manikin," as taxidermists call it, the skin is then fitted and carefully moulded to follow the outlines. In case of the larger mammals the nostrils, mouth, and tongue are truthfully reproduced in some material easily moulded. The crude glass eyes formerly used have been replaced with hollow globes painted in startlingly close resemblance to the natural eye. The larger birds and fishes are mounted in a similar manner.

Patience and delicacy of touch are qualities needed by the successful taxidermist. One of the most difficult and wearisome processes is the removal of the skin in such manner as to disfigure it as little as possible. With sharp knives and scissors the taxidermist makes an incision at the proper place, usually along the stomach, and then patiently works the skin loose bit by bit until it comes off whole. Preservatives,



The Moa, which was sometimes 10 to 12 feet high, lived centuries ago in New Zealand. Only a skilled taxidermist could rebuild his body from fossil bones so it looks alive.

such as arsenical soap or a mixture of burnt alum and saltpeter, are then carefully worked into the skin to keep it from spoiling. Some of the most famous taxidermists in the world are found at the American Museum of Natural History in New York City, and in Ward's Natural Science Establishment in Rochester, N. Y., which is now affiliated with the University of Rochester.

Perhaps the highest development of the taxidermist's art is the restoration of fossil animals. This work often requires a knowledge of geology and of the evolution of animal life through the ages, as well as an intimate study of the anatomy and habits of living animals whose structure is similar to that of the extinct species. In many cases, when only a part of a skeleton has been found, the taxidermist must laboriously build up the missing parts, calling upon a vast store of technical knowledge to aid him.

"Old Rough and Ready"—FIGHTER and PRESIDENT

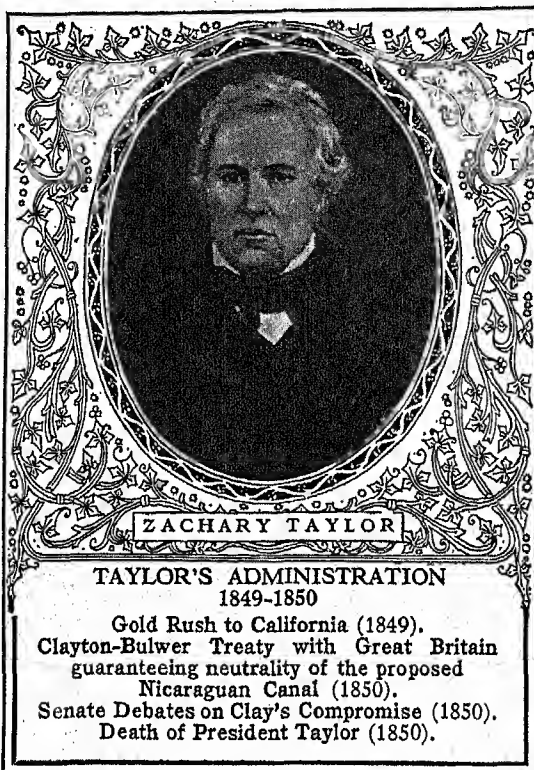
TAYLOR, ZACHARY (1784-1850). General Zachary Taylor, the 12th president of the United States, was the first man to be elected to that high office with no previous political training, and he was the third to be chosen because of his military exploits. Like Andrew Jackson, Taylor was a frontiersman. Though he had been born in Virginia, the family had migrated to Kentucky before he was a year old. There he grew up with little schooling, for schools were unknown in that region when he was a boy. But around the fireside frequently gathered his father's comrades of Revolutionary days. It is probable that the conversation at such times inspired in him and his brothers the desire to be soldiers, for four out of the five boys entered the army.

Zachary obtained in 1808 a commission as first lieutenant in a recently formed regiment of United States troops. His service in the army covered a period of 40 years, extending to the time when he was elected president. During that time he served in the War of 1812, against the Indians in the Northwest and in Florida, and in the Mexican War. On the Northwestern frontier he aided in the campaign against Black Hawk, and was the officer to whom that warrior surrendered in 1832.

In 1846 General Taylor was ordered to occupy the disputed territory between the Rio Grande and Nueces rivers in Texas. Both Mexico and the United States claimed this territory, and as soon as Taylor moved into it he was attacked by the Mexicans. As a result of this attack, Congress declared war on Mexico, on the ground that "American blood had been shed on American soil." After Taylor had won a victory over the Mexicans at Monterey, President Polk, who distrusted Taylor's views against the war, sent General Scott to Mexico as chief commander, and gave most of Taylor's troops to the new general. Santa Anna, the Mexican commander, learning of Taylor's weakened condition, immediately attacked him at Buena Vista; but after an all-day battle "Old Rough and Ready," as Taylor was called by his troops, won the day. This victory, won against such odds, fired the public imagination and made

Taylor the hero of the hour. He was immediately mentioned as a possible candidate in the presidential election to be held in the next year, 1848.

But Taylor, having been a soldier all his life, had not voted, much less allied himself with either party. As a result, both parties wished to secure him for their candidate. At first Taylor discouraged all political demonstrations in his behalf, but he finally yielded and set forth in a letter his views on the important questions of the day. This letter proved acceptable to the Whig leaders. Remembering their victory in 1840, when General Harrison was their candidate, they were glad to secure another military hero as their standard bearer. His running mate was Millard Fillmore, a New York Whig, who succeeded to the presidency upon Taylor's death. Taylor had, a few years before the Mexican War, purchased a plantation in Louisiana. This plantation, which was



worked by slaves, and Taylor's connection with Jefferson Davis, who was his son-in-law, won for him many Southern votes, and he was triumphantly elected over Senator Lewis Cass, the Democratic candidate.

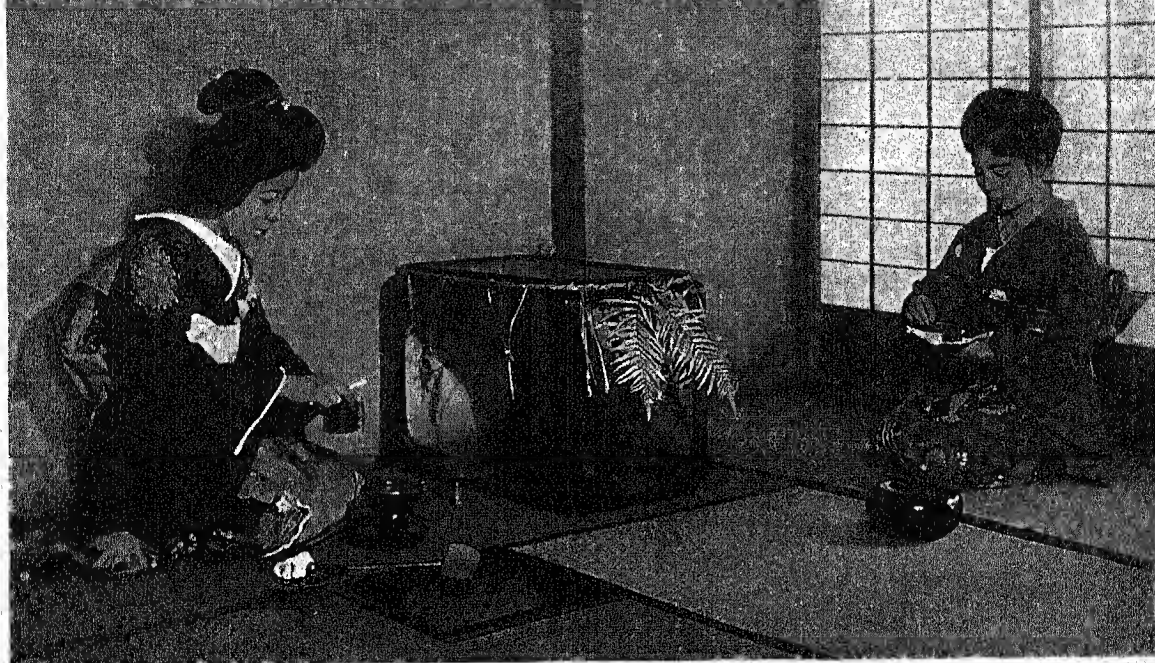
After Taylor was inaugurated, however, he proved to be less Southern in his views than some had hoped. He advised that California form a state government and decide on her own institutions; and when that state asked to be admitted as a free state, he recommended that Congress grant the request. He also took steps to prevent secession when this move was threatened by the South. In foreign affairs his secretary of state, John M. Clayton, negotiated the Clayton-Bulwer treaty with Great Britain which paved the way for a Panama Canal constructed by the United States.

Unfortunately for the country, President Taylor died after only 16 months in the presidential chair, and while the historic debates on the Clay compromise were still under way (see Compromise of 1850). Many people believe that if he had lived, the slavery controversy might have been adjusted. Senator Benton said of him: "No man could have been more devoted to the Union or more opposed to slavery agitation; and his position as a Southern man and a

slaveholder, his military reputation, and his election by a majority of the people and of the states would have given him a power in the settlement of these questions which no president without these qualifications could have possessed." Taylor did not approve some features of the Compromise of 1850.

President Taylor was an honest man who as president had no political friends to reward or enemies to punish. It was because of this separation from politics that he had so great an influence, and also because he chose for his advisers men who could supplement his own lack of political experience.

WHEN *the* WORLD SITS DOWN *to* TEA



Every Step in the Japanese Tea Ceremony is Part of an Old and Graceful Ritual

TEA. When tea drinking was first introduced from Asia into England in the 17th century, many opposed it vigorously. One man in a moment of heat denounced it as a "base unworthy Indian practice, and a filthy custom." But the use of tea increased steadily, and now the British Isles must import about nine pounds for every man, woman, and child every year to keep the national tea pot going. The New Zealanders, Australians, and Canadians are not far behind. The Chinese, Japanese, and Tibetans, however, are still the greatest tea drinkers of all; and the Russians long ago adopted the habit from their eastern and southern neighbors. The people of the United States, preferring coffee, consume annually less than a pound apiece.

Tea as we know it is the dried and prepared leaf of several varieties of evergreen shrubs or small trees which have been cultivated in China and India for more than 2,000 years. About 1840 British India began to export tea grown on its own plantations, and

because of improved methods of cultivation and preparation the British growers are now the largest exporters in the world. China still grows more than any other country, but most of its production is consumed at home, so that in exports it is surpassed by India, Ceylon, and Java and Sumatra. Japan and Formosa are the only other considerable sources of supply. Tea has been grown in North and South Carolina, but the higher cost of labor makes competition with Asiatic countries impossible. South Africa and Nyasaland grow small quantities. Assam, a province of India, is perhaps the original home of the tea plant, since one variety grows wild there.

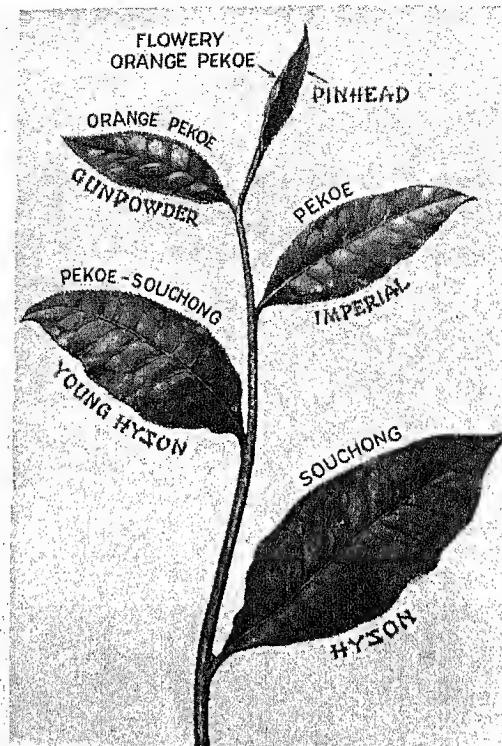
Tea thrives best at moderately high altitudes in a warm moist climate. On the great plantations of Ceylon and India, hundreds of acres are covered with the gray-green foliage of tea plants, set out in rows four feet apart or more. The wild plants grow to the size of small trees, but in cultivation they are pruned to a height of three to five feet.

Tea plants in bloom show a profusion of scented white or pinkish blossoms. These look very much like little wild roses, with petals encircling a cluster of yellow hairlike stamens tipped with pollen; the petals, however, are thick and waxy. The leaves are leathery and lance-shaped, with saw-tooth edges. Look at one of the open leaves left in the teapot after the tea is poured and you will see how much it resembles a rose leaf. The leaves when fully grown are three or more inches long, but as only the bud and three or four leaves are plucked, we find none as long as two inches in our packages of tea.

The plants are ready for the first picking when they are about three years old. At that time they are sending out an abundance of young leaf shoots, known as the "flush," and these are picked. As new shoots grow on the twigs, another crop is gathered. In Ceylon, Java, and Sumatra, where it is always summer, the flush is

ready for picking about every ten days, but in the colder parts of India, China, Japan, and Formosa,

THE DIFFERENT KINDS OF TEA



Teas get their trade names, not from different tea plants, but from the position of the tea leaves on the stem. The nearer the tip, the better the grade. The names in the black type on this picture are used for black teas; those in color apply to green or Chinese teas. Variations in quality of tea may be due also to the character of the plants themselves and the districts where they grow. A plain pekoe from one plantation, for example, might excel an orange pekoe from another.

there are only three to five pickings a year. Unskilful or careless picking always yields tea of poor quality. The tea pickers carry big baskets or bags hanging from their head or shoulders. Their trained eyes single out from the wealth of foliage the tender young shoots, and they deftly break off the tops at just the right place and toss them into their baskets, apparently with one motion of the arm.

Quality in tea is determined not only by the size of the leaf, but by the elevation of the garden in which it is grown, and the care taken in fertilizing and cultivating. The flavor is due to the method of curing and to the essential oils in the leaf, but its stimulating and refreshing qualities come from the small percentage of *thein* which it contains. Thein is chemically the same as caffeine, which occurs in coffee, cocoa, Paraguay tea (*yerba maté*), and the colanut. Chemically it is an alkaloid which acts as a mild heart and brain stimulant.

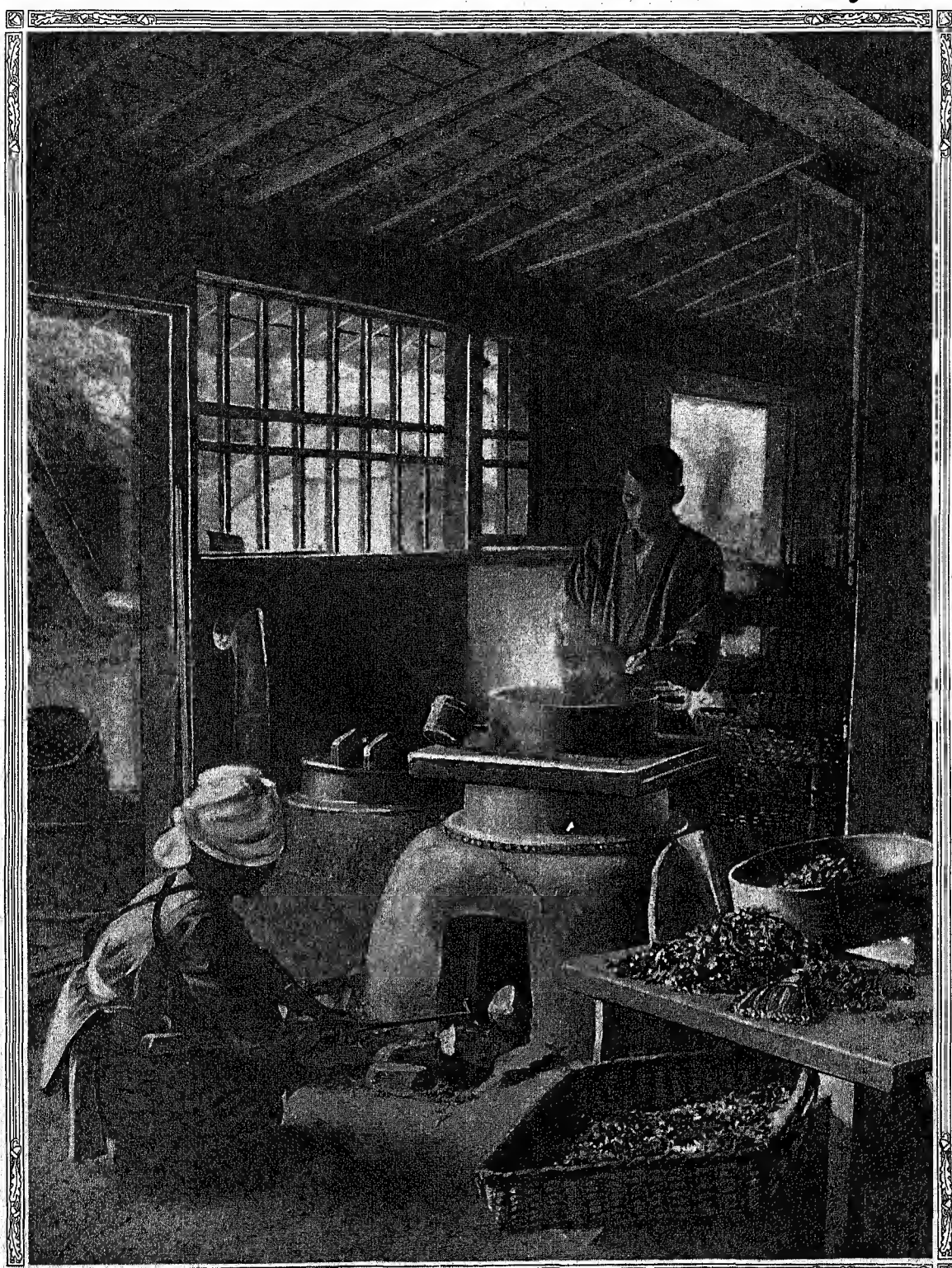
It may be dangerous if taken in excessive quantities. The percentage of tannin in tea is small. The beverage

UMBRELLA HATS ON A JAPANESE TEA FARM



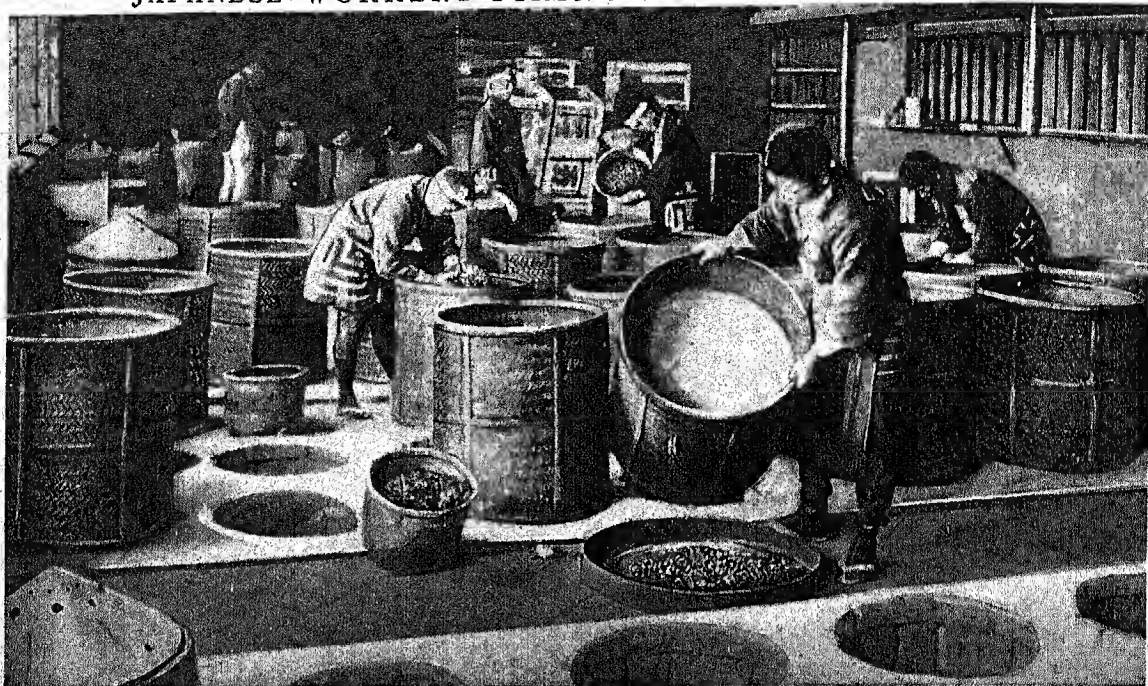
These pickers on a Japanese tea farm have sat down to rest. Near by are the big baskets, which are hung from their backs when the pickers are at work. Into these baskets, with a deft motion, they toss the buds and the leaves. The tea plants look like bushes because they are kept pruned to a height of from three to five feet so that even the children can reach them, and the pruning also causes the plant to produce more leaves instead of running to wood.

STEAMING THE LEAVES FOR GREEN TEA IN JAPAN



Workers on the great Japanese tea gardens are busy people at harvesting and curing time. Here one man tends the charcoal stove while the other stirs the freshly picked tea as it steams over the fire. Steaming makes the leaves soft and flaccid, and seals their pores so the sap does not ferment, for the Japanese specialize in green, or unfermented, teas. Later they will cool the tea and roll it into little twists; then they will take it to the city factory to be fired or dried, sifted, and packed.

JAPANESE WORKERS FIRING THE TEA IN BASKETS



When you buy "Basket-Fired" tea of the grocer, you get a tea that has been dried in baskets like these. The tea is put into trays; these trays are set into baskets and the baskets are set into those holes which are really ovens.

SIFTING BY MACHINERY AND BY HAND



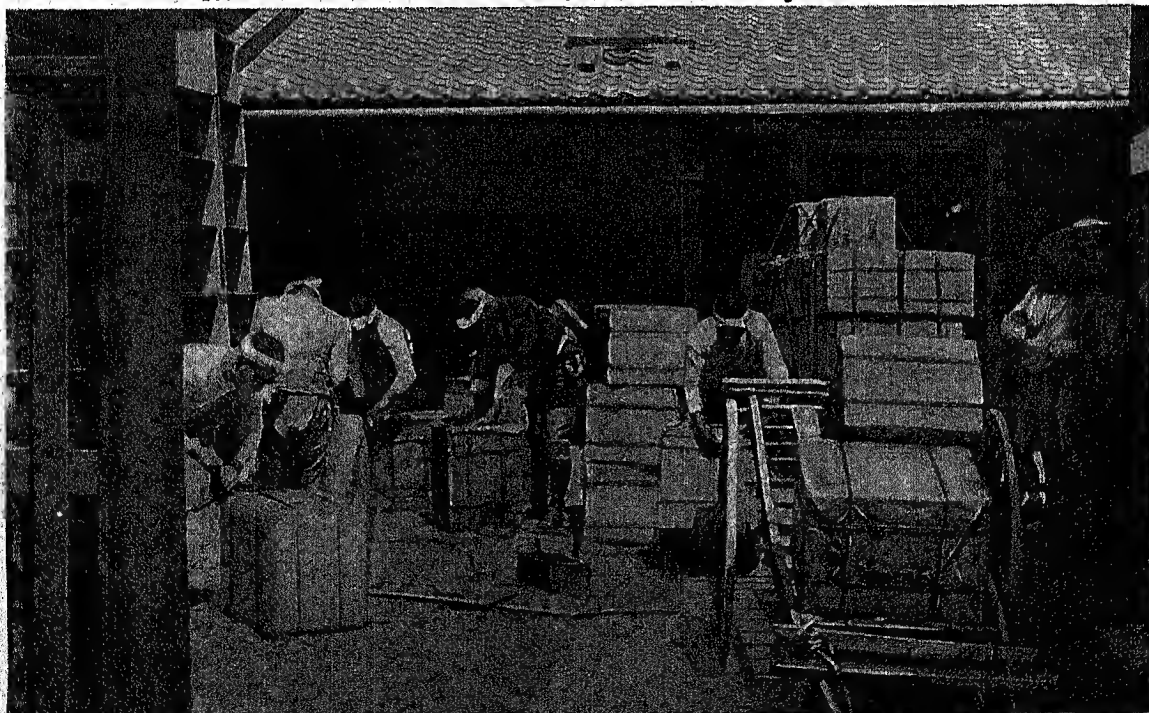
After tea has been fired, it is sorted into the various grades by sifters. The different grades are based on the size of the leaves. The smaller and therefore the tenderer the leaf, the better the tea. The picture on the left shows how this sifting is done by machinery, and on the right how it is done by hand. Tea which is much broken up is often objected to because it is supposed to be of inferior quality, but experts say the more it is broken up, the more readily it will yield its strength when steeped, with the result that the excessive steeping which makes tea bitter is unnecessary.

PICKING OUT THE STEMS AND STICKS



In picking tea leaves, even the most expert worker gathers more or less imperfect leaves and stems. After the leaves have been through the various processes of firing and sifting, they are dumped in piles on tables like this, and sharp-eyed girls go over them carefully to remove the sticks and other bits of undesirable matter.

READY AT LAST FOR ITS LONG JOURNEY



Just before it is ready to be packed for its long journey across the sea, tea is fired again. While still warm it is packed tightly in lead-lined chests and the lead covers are completely soldered over so that it may be kept air-tight and retain its strength and aroma until it is opened at the grocery store. In this picture the lead covering has already been put on and the men are wrapping the chests in matting and fastening stout bands around them.

smells and tastes best when the leaves are steeped in boiling water, but not boiled.

Green tea and black tea are made from the leaves of the same plant by different processes of manufacture. In curing black tea, the freshly picked leaves are spread out on trays for 18 or 20 hours, and wilted by cool drafts of air until they are as soft as velvet. Then they are rolled, by hand or by machines, to break down the leaf cells and bring the juices to the surface so they can be oxidized by the air and fermented. Sometimes the leaves

are sifted at this point, and the larger ones are given an additional rolling. Next they are spread upon tables and allowed to ferment for a few hours.

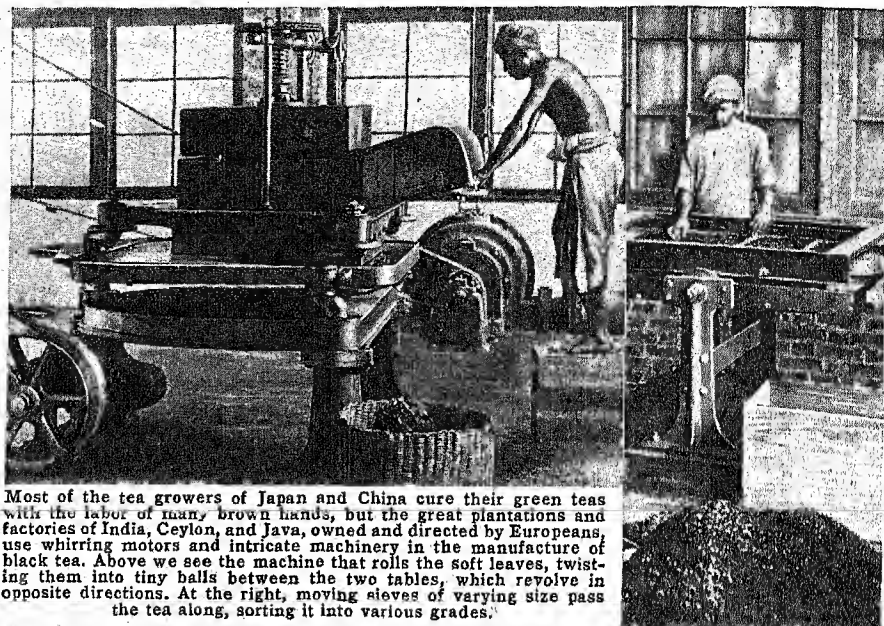
When the leaves turn the color of copper, from the oxidation of their tannin, and give out the fruity fragrance of ripe apples, they are fired, or dried, by hot air at temperatures up to 250° F. In India, Ceylon, and Java, where most of the black tea is made, the firing is done in modern factories by automatic machinery. The firing machine is a chain series of small trays, moving on a carrier over the fire. After the

PICKING TEA IN CEYLON



Picking tea is a lightning operation for a skilled worker. Both hands fly as this Tamil maiden fills the large basket on her back with the leaves. Women do much of the picking.

ROLLING AND GRADING BLACK TEA



Most of the tea growers of Japan and China cure their green teas with the labor of many brown hands, but the great plantations and factories of India, Ceylon, and Java, owned and directed by Europeans, use whirling motors and intricate machinery in the manufacture of black tea. Above we see the machine that rolls the soft leaves, twisting them into tiny balls between the two tables, which revolve in opposite directions. At the right, moving sieves of varying size pass the tea along, sorting it into various grades.

leaves and buds are dried, they are sifted again and sorted into the various grades.

Green Tea and Black Tea

Green tea is unfermented tea, and comes from Japan and China. It is steamed immediately after picking to seal the leaf and prevent the sap from fermenting. Then it is lightly rolled and twisted, and finally fired. Modern machinery is rare in China, and is just being installed in Japan, so green tea is generally rolled and twisted by hand, and fired in tall baskets or great copper pans over a charcoal fire. It is called "basket fired" or "pan fired" according to the method used.

Japanese scientists who conducted experiments with green and black teas declare that green tea contains some vitamin C.

Oolong tea, a favorite in America, is a slightly fermented tea, cured chiefly on the island of Formosa.

Tea is given a special firing when it is ready for export. It is packed in lead-lined boxes to protect it from the salt sea air, which would spoil its flavor.

Since tea absorbs odors readily, it is sometimes perfumed in China and Formosa. Layers of jasmine flowers are spread on top of the tea for a few hours, or sometimes they are fired together. The flowers are later sifted out in some varieties.

Brick tea, made of tea dust and broken leaves steamed and pressed into cakes, is exported to Russia. A coarse brick tea, made of leaves and stalks, is sent to Tibet and Mongolia, where it passes as currency. Tibetans add soda, butter, and salt to their tea.

Tea Ceremony in Old Japan

Tastes in tea flavors and tea-making customs vary around the world. The Chinese and Japanese like best the unfermented teas, which produce a straw-colored drink. Customs dating back to the Middle Ages go to

make up the Japanese tea ceremony, which is held in a room specially built for the purpose. In the picture on page 21 of this article we see a hostess preparing tea for a guest. Deftly and gracefully she has brought the utensils into the room and has seated herself before the hearth, which is built into the floor. On the hearth is a jar of hot water with a bamboo dipper resting on the lid. After rinsing the tea bowl the hostess places in it some powdered tea from a small lacquered caddy. Pouring a dipper of water over the tea, she beats the mixture to a froth with a bamboo whisk. The guest, meanwhile, is eating sweets. On taking them from the sweet jar she places them on a piece of paper which she has brought with her. Hostess and guest may drink from the same bowl or each may have one. In the cabinet between them are utensils for a more elaborate tea ceremony.

Black tea is the choice of the British, the greatest tea-drinkers of the Western World. They usually add milk and sugar to the cup. Everyone takes time off for afternoon tea in England. Americans once preferred green teas, but today fermented varieties are becoming increasingly popular.

The Russians seldom use milk or sugar, but usually add a slice of lemon or some spice. In Switzerland cinnamon often is steeped with the leaves. An infusion of tea and mint is a favorite beverage in North African countries. In Turkestan, fermented tea is boiled until nearly black, then cream is added. Bread is soaked in the liquid and eaten. The Persians boil their tea and add spices.

"Yerba Maté" and Other "Teas"

There are a number of plants whose leaves are used in preparing tealike drinks. The most important of these probably is "Paraguay tea" or *yerba maté*, which is made from the leaves of a species of holly found in Brazil and Paraguay. Maté has an agreeable, slightly aromatic odor, and a somewhat bitter taste. The Indians of North Carolina prepared a tea called 'yaupon' from the leaves of another hollylike tree or shrub. It resembled strong black tea, with an odor not unlike oolong, and it was extensively used in Revolutionary times as a substitute for China tea in the tea-tax days. A tea is also prepared in Peru and Bolivia from the dried leaves of the cacao tree. Trinidad tea is prepared from a decoction of the leaves of the pimento or allspice tree, and is in common use in Trinidad and other islands of the West Indies, both as a beverage and as a medicine. Coffee-leaf tea is used in many coffee-growing countries; the natives often preferring it to any decoction of the berry. Every child, of course, is familiar with the "sassafras tea" prepared from the aromatic roots and bark of the sassafras tree, and with "cambrie" tea, a mixture of cream, sugar, and hot water.

The scientific name of the tea of commerce is *Camellia thea*, of the family *Theaceae*. The chief varieties are *bohea* and *viridis*. There has always been a dispute as to the original home of the plant, but most botanists now believe that it is native to the whole monsoon region of eastern Asia. To make the tea blends preferred by the palates of many

lands, delicate testing and blending is necessary. Expert tea testers can tell the country, altitude, climate—and sometimes the individual garden—in which the tea was grown, by tasting, smelling, and examining beverage and leaves. Government experts set the standards for teas to be accepted into United States ports each year.

TEAK. One of the finest of all woods comes from the teak, a tree of India which must be at least 100 years old before it is ready to be cut for timber. It grows in scattered patches, very rapidly at first, and mixed with a dense growth of other kinds of trees, many of them larger than itself. When fully grown it may be 140 feet in height, with a straight trunk of perhaps 60 feet. This produces a log of valuable length, but one not always solid at the core. The teak of more open country grows less rapidly, but produces the finest quality wood, dense and solid.

The teak is a deciduous tree, that is, one that sheds its leaves periodically. It has long rough leaves, one or two feet in length, and with many panicles of white flowers on the higher branches. Its fruit is a hard-shelled nut, with four seeds which do not germinate readily. The light nuts are easily washed into the rivers by rains, so there are few seedlings in a forest of teak. With a little care of the seed and protection of the young trees, however, they are easily cultivated. They grow best in rich moist soil, on the banks of streams, near the sources.

The tree is not cut until it is at least six or eight feet in girth, and often as much as 200 years old. It is first girdled, that is, the bark and sap-wood are cut through completely around the trunk; then the tree stands for two or three years until it is dry enough to be floated down-stream to the ports. Green teak is too heavy to float.

A resinous oil in the wood gives teak an aromatic fragrance, especially when green, and extraordinary durability; the oil also protects it from insects and fungi, and prevents the rusting of iron in contact with it. Teak does not warp or crack when seasoned, and teak timbers in old buildings have been found almost unchanged after centuries. Bits of teak found in Indian caves are over 2,000 years old. It is the best of all woods for shipbuilding. Since it is not very hard, is easily worked, takes a good polish, and is a golden-brown color, darkening with age, it is also one of the finest woods for cabinet work and for building.

The teak is native to India, Burma, Siam, Java, and Sumatra, and grows also in the Philippine Islands and other tropical countries. Some is shipped to Europe, mostly from Burma, but most of it is used in the Far East. Scientific name, *Tectona grandis*.

TECUMSEH (1768-1813). Of all the struggles of the Indians to hold their lands against the white men, the most dramatic was the one which had for its leader the great Shawnee chief, Tecumseh. Born on Mad Creek, near the present city of Springfield, Ohio, about the year 1768, he had from his earliest childhood seen suffering brought to his people by the whites. Year after year he beheld his people deprived of their homes and pushed farther and farther back from their

fields and hunting grounds; he saw them demoralized also by the white men's "fire-water" sold them by unscrupulous traders. He knew that the fate of the Indians was sealed unless they should join together in resisting the invaders. So he formed his plan of uniting the Indian tribes in a great confederacy. About 50 years earlier the Ottawa chief Pontiac, in alliance with the French, had formed a similar confederation against the English colonists, but the signing of the treaty of 1763 had put an end to his dreams, and Pontiac himself was slain a few years later.

Tecumseh hoped for better success through the formation of a permanent confederacy. He went from tribe to tribe, firing the Indians by his eloquence, for this untaught savage was a natural orator of great power. He was aided by his brother Tenskwatawa, "The Prophet," who was believed to possess miraculous powers. The brothers established at the junction of the Tippecanoe and Wabash rivers, in northern Indiana, a village known as "the Prophet's Town," which was to be the headquarters of the federation.

A Bargain in Land

Then in 1809 Gov. William Henry Harrison, of Indiana Territory, negotiated the Treaty of Fort Wayne by which certain Miami chiefs ceded to the United States government about 3,000,000 acres of land on both sides of the Wabash, at a price which amounted to one-third of a cent an acre. Tecumseh claimed that the chiefs had no right to barter away hunting grounds that belonged to all the Indians for a few paltry gifts or a keg or two of liquor. At a council held at Vincennes he told Governor Harrison that there could be no peace between the Indians and the whites until the land was ceded back.

Tecumseh then set out on a long mission to the southern Indians to enlist their support. In his absence Governor Harrison began the construction of a blockhouse on the ceded land where Terre Haute, Ind., now stands. After some friction with the Indians, he marched upon the Prophet's Town, and in the bloody Battle of Tippecanoe, near the site of Lafayette, he completely defeated the hostile Indians. The Prophet's Town was then completely destroyed. This ended forever Tecumseh's dream of a powerful Indian confederacy. (See Harrison, William Henry.)

Next year the War of 1812 broke out, and Tecumseh joined the British. He brought a large force of Indians to their support in Canada, and was given a commission in the English service. Fighting side by side with white soldiers he distinguished himself not only by his bravery and skill as a warrior, but by the humanity which he showed toward his foes. At the siege of Fort Meigs, for instance, he prevented a terrible massacre of the American prisoners. After playing an important part in several other engagements, he met his death in the Battle of the Thames, while bravely resisting an attack of American cavalry under Col. Richard M. Johnson of Kentucky. He was one of the greatest of American Indians, with a superb body, a powerful mind, and the soul of a hero.

TEETH. By cutting, tearing, and grinding our food, and by helping to mix it with saliva, teeth perform the first task of food digestion, called *mastication* (see Digestion). The development of sturdy teeth in childhood is therefore most important. Equally important is the care of the teeth throughout life, for a decayed or infected tooth cannot do its work properly and may send poisons to other parts of the body.

The baby's first tooth usually appears when he is between six and nine months old. Temporary, or milk, teeth continue to appear for two or three years, until the child has 20 in all. Good food is needed to provide the lime and other materials out of which the body builds these milk teeth and they must be well cared for. Poor or decayed milk teeth may prevent the development of sound and healthy permanent teeth.

The first four permanent teeth, the six-year molars, appear at the ends of the two rows of milk teeth. Thereafter all milk teeth are gradually replaced by permanent teeth, which cut off the food supply of the milk teeth, absorb their roots, and finally push them out.

Later eight more molars appear. The last four are the wisdom teeth, which appear between the ages of 17 and 25 or even later. The wisdom teeth do little or no work, and seldom grow to the level of the other molars.

A complete set of 32 teeth includes four kinds, each designed for a special task. The *incisors* have sharp, chisel-shaped edges for biting and cutting. Four stand in the middle of each jaw. The four *canines*, or "dog teeth," have jagged edges for tearing or shredding. They stand next to the incisors. In the upper jaw they are called the "eye teeth." Next come the eight *premolars*, or *bicuspid*s, double-pointed teeth which both shred and grind. Finally at the ends of each arch stand the *molars*, twelve in all, including the wisdom teeth. The molars have flattened crowns for grinding and crushing.

Each upper tooth bites against its mate in the lower jaw and also against the lower tooth towards the back. If teeth do not fit together properly, the misplaced teeth should be straightened, to improve the "bite."

The Parts of a Tooth

When we look at a human tooth more closely we find that it has three parts, the crown or part which we see and which is covered with hard white enamel, the neck, and the root, which is buried in a socket in the jaw bone. Beneath the crown lies a hard bony substance called "dentine." And underneath this is a hollow filled with tooth-pulp. This is really a mesh of blood-vessels and nerves—which tells us at once how the tooth is fed, and why we have toothache when we break the enamel and the dentine decays so as to expose the delicate nerves.

From the structure of the teeth we can tell the food and the habits of any animal—whether they are beasts of prey and live on animal food, or whether they are grazers, or gnawers, or the like. Fishes and snakes have sharp teeth which do not rest in a socket; in crocodiles they do. Birds today do not have teeth,

THE TEETH THAT CUT, TEAR, AND GRIND OUR FOOD

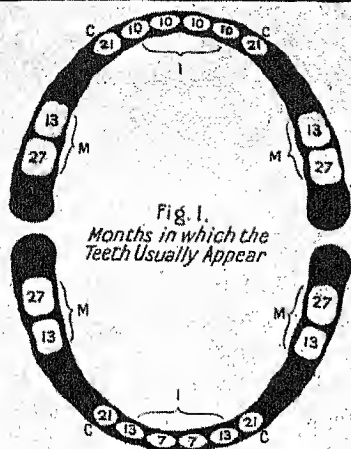


Fig. 1.
Months in which the
Teeth Usually Appear

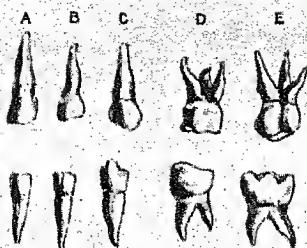


Fig. 2.
Examples of Milk Teeth

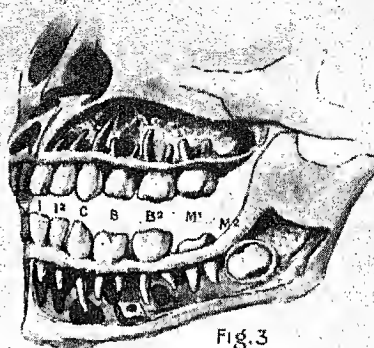


Fig. 3
Teeth of a Child of Six

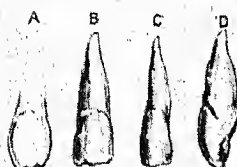


Fig. 4.
Incisors



Fig. 5
Canine

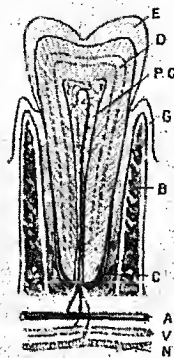


Fig. 6.
Vertical Section
of a Tooth

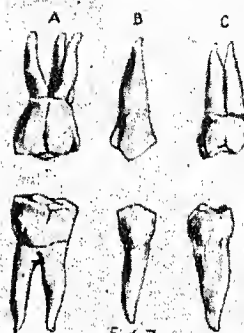


Fig. 7.
First Molar and First Bicuspid

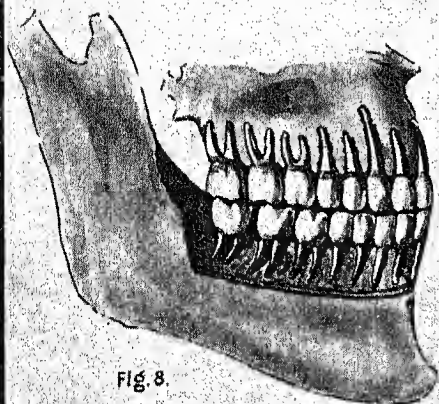


Fig. 8.

Teeth in Position

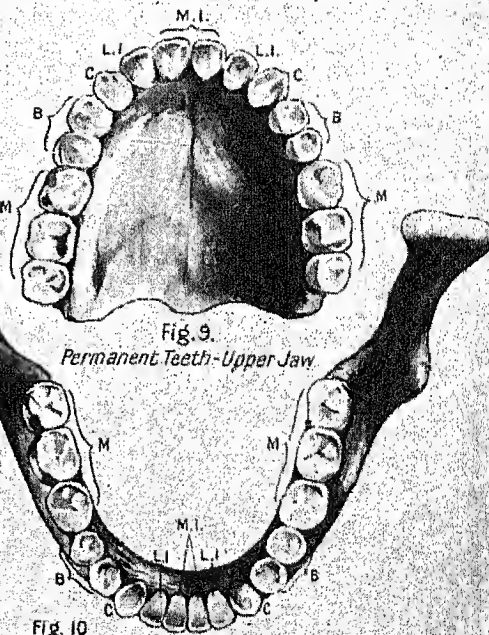


Fig. 9.
Permanent Teeth - Upper Jaw

Fig. 10
Permanent Teeth - Lower Jaw

These pictures trace the development of teeth and show their structure and arrangement. I means incisor, C means canine, B means bicuspid, and M means molar; L.I. and M.I. are lateral and middle incisors respectively. Fig. 1 shows that the lower incisors are the first to appear in an infant, usually cutting through about the 7th month. Fig. 2 shows the shape of the various milk teeth from the incisors (A) to the molars (E). Fig. 3 shows the teeth of a six-year-old. All but the first molar are milk

teeth, and the second molar is shown as still buried. Figs. 4, 5, and 7 show the shape of the various permanent teeth. In Fig. 6 we see the structure of tooth and socket—E, enamel; D, layers of dentine; P.C. pulp cavity; G, gum; B, bone; C, cement surrounding root; A, artery feeding blood to the tooth; V, vein carrying away blood; and N, the nerve—the last three all running into the pulp cavity. Figs. 8, 9, and 10 show the arrangement of the 32 teeth of an adult.

though some fossil species had them. The great "cutting" teeth of beavers are just modified incisors, and so are the ivory tusks of elephants.

With proper food and good care, it is likely that we could all enjoy the beauty and satisfaction of good teeth as long as we live—barring accidents. Proper food contains the minerals and vitamins essential to the continuous nourishment of our teeth. It also has some tough fibers which we have to chew vigorously. This promotes the flow of blood in the gums, so that the food elements are carried to the teeth and both teeth and gums are kept healthy.

Good care includes a number of practises. First, we must not break the enamel by cracking nuts or other hard substances with our teeth, or by subjecting

it to sudden changes in temperature from the liquids we drink. Second, careful brushing is essential. Use a brush of medium stiffness. Handle it with a rotary motion, starting at the gums and working toward the teeth. Do not move the brush from the teeth toward the gums, as this may injure the tissues at the edges. Brush between the teeth as well as over their surfaces. In this way circulation in the gums is stimulated and the teeth are cleaned of food particles which may harbor bacteria harmful to both gums and enamel and dangerous to health. A good powder or paste will help in the cleansing, and a mouth wash at night is beneficial. Finally, visit the family dentist twice a year, so that decayed spots may be cared for as soon as they appear.

The FLASHING WIRES that GIRD the EARTH

The Miracle of the Telegraph and How It Carries Messages with the Speed of Lightning—The Story of Ancient Signal Systems—Morse's Great Invention and How It Works

TELEGRAPH. When George Washington died it was weeks before the news reached some of the remoter settlements of the United States. Today every important event that occurs anywhere in the United States or the great cities of the world is flashed to every other city in the remarkably short space of a few seconds or minutes.

For thousands of years men have been experimenting with methods of telegraphing (from the Greek words meaning "to write at a distance")—that is, sending news by signals to distant places. Earliest of these devices was the signal light or beacon fire. You recall how Paul Revere, before starting on his midnight ride, arranged lantern signals from the belfry of Old North Church tower to tell of the coming of the British—"one if by land, two if by sea." When the great Spanish Armada threatened to land on England's shore, beacon fires were lighted on the hills of England's seacoast to summon the defenders.

Sunlight flashed from mirrors of glass or polished metal according to code signals is another ancient device for telegraphing. Napoleon used these light signals, or "heliographs," for communicating military orders, especially in his Egyptian campaigns. North American Indians made use of puffs of smoke, made

by holding blankets over fires and releasing them at intervals. Semaphore signals with arms at an angle, somewhat like signals used by railroads today, were in general use in the 18th century throughout Europe, especially in France and Russia. (See Signaling.)

But these pioneer telegraph systems were all dwarfed to insignificance by the invention of the electric telegraph. Almost as soon as men began to investigate electricity the idea of using it for sending messages was born. Franklin and others experimented with the Leyden jars, but not until the time of Sir Charles Wheatstone and Sir William Cooke in England, and Morse in the United States, was any practical system of telegraphy devised. Morse's system was the best and led to the development of the modern telegraph system. (See Morse, Samuel F. B.)

Morse completed a working model of his epoch-making invention in

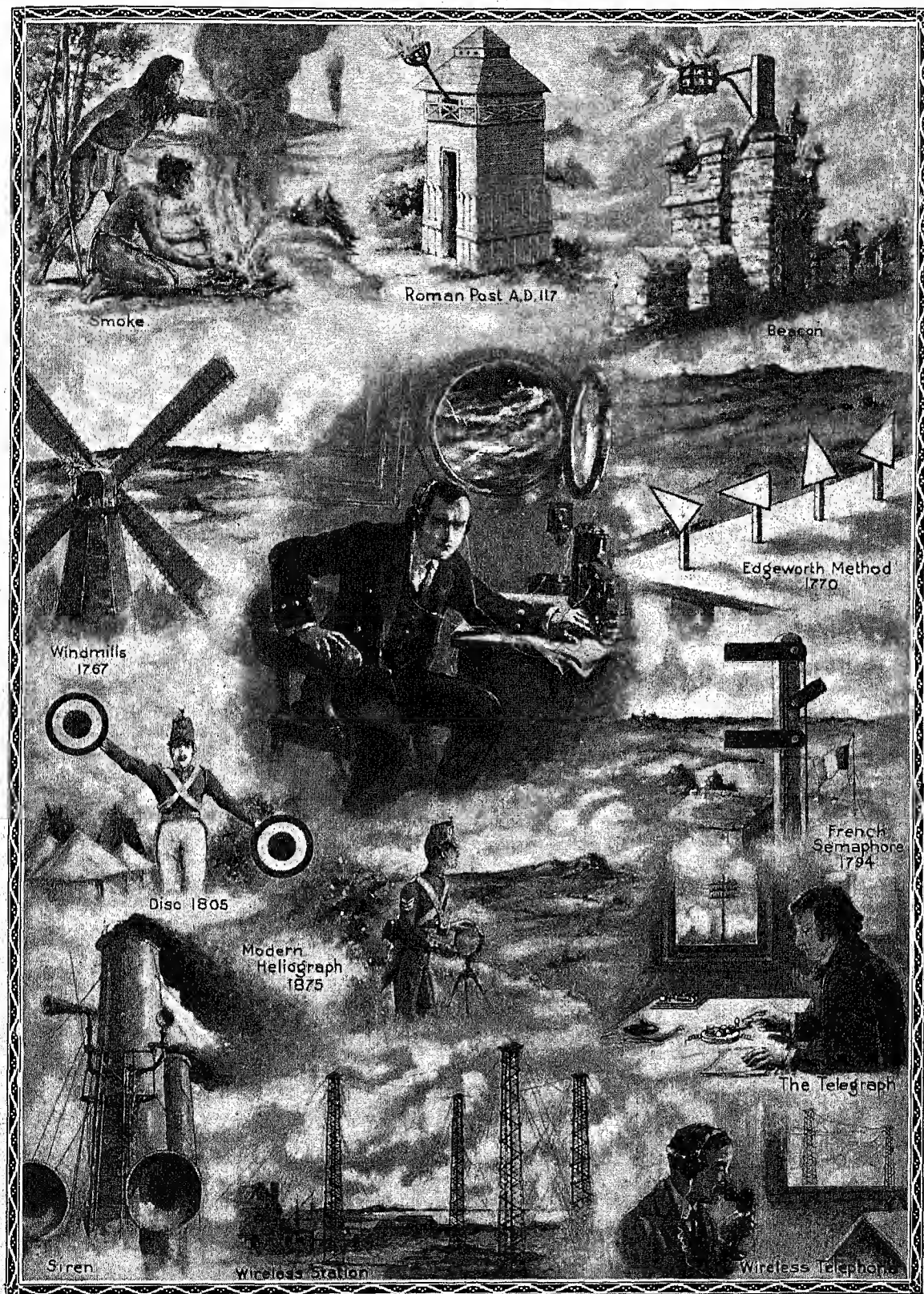
1835. He filed *caveat* for patent in the United States in 1837, and in 1844 the first telegraph line for commercial purposes was built between Washington and Baltimore. As in the case of most startling inventions, people were skeptical about Morse's device and heaped ridicule on the idea that messages could be actually carried over wires in such a mysterious way,

THE TELEGRAPHER'S ALPHABETS

A	---	Q	----	5	-----
B	----	R	(---)	6	(---)
C	----	S	(--)	7	(-----)
D	(--)	T	---	8	(---)
E	---	U	---	9	(---)
F	(---)	V	----	0	(-----)
G	----	W	----	.	(-----)
H	----	X	(---)	,	(-----)
I	--	Y	(---)	?	(-----)
J	(---)	Z	(---)	:	(-----)
K	---	1	(---)	"	(---)
L	(---)	2	(---)		
M	---	3	(---)		
N	---	4	(---)		
O	(-)				
P	(---)				

Both Morse and International codes are shown here, Morse (where different from International) being in parentheses. All land lines in the United States and Canada use Morse, while radio and the land lines of other countries use International code.

"TELEGRAPHING" THROUGH THE AGES



Operation was at first unprofitable and development was slow. But the railroads soon adopted the new device to aid in the running of trains. Today the United States is crossed in every direction by a network of wires—more than 2,000,000 miles of them—over which pass many millions of messages a year. Telegraph principles have also been extended under the sea and also through the air (see Cables; Radio).

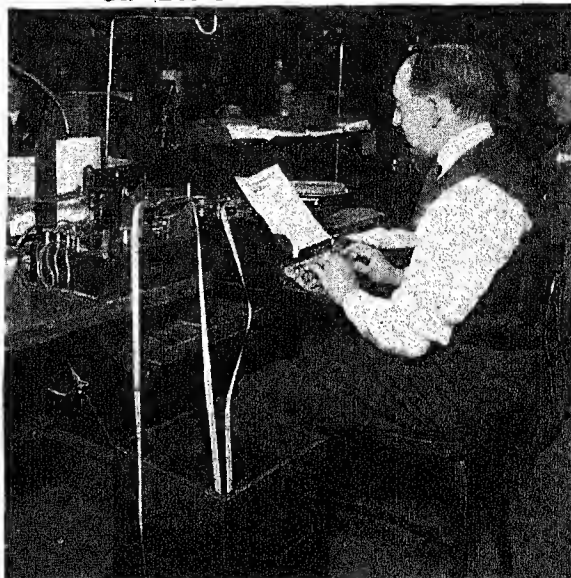
A telegraph system, in its simplest form, consists of a dependable supply of electric current, a path over which the current may travel, and apparatus for sending and receiving messages. In the early systems current was supplied by battery cells, but the invention of the dynamo and the storage battery has furnished a more steady and constant current for telegraph purposes (see Electric Generator and Motor). Only one wire is needed to join one station with another, for the circuit is completed by "grounding" or connecting each terminal with a metal plate sunk in the ground, and the return circuit is made through the earth.

The sending instrument or transmitter is simply a convenient means for opening and closing the electric circuit. When the key of the transmitter is pressed down the circuit is closed, and when the key is released a spring pulls it up and breaks the circuit. As the circuit is closed and opened, the current flows and stops; and the action of electricity is so lightning-swift that the opening and closing of a telegraph key in New York is recorded in San Francisco at almost the same instant. Quickly pressing down and releasing the lever represents the "dot" in the Morse code, and holding for a slight interval represents a "dash." How the dots and dashes represent letters is shown on page 30. The code used in the United States is called the Morse code, and is based on the code devised by Morse himself. In other countries and for intercontinental messages the International code is used.

At the other end of the circuit is the receiving instrument, or sounder. It was in the construction of the sounder that Morse made his big contribution, for he employed the newly discovered electromagnet, which made it possible to receive messages at distances so great that the current has become quite weak (see Magnet). When the current reaches the sounder, it flows through coils of wire wrapped around a bar of soft iron. This bar then becomes a magnet and

attracts a metal bar (called an armature) on a lever, so adjusted that it strikes with a click. The instant the current ceases to flow, the magnetic force is lost and the lever is released and pulled up by a spring. As the circuit is rapidly closed and opened by the sending of the dots and the dashes from the key, the lever snaps down and up against metal stops, and clicks off the sounds which you hear in a telegraph office.

CABLING ACROSS THE SEA



Before the operator is a dispatch for Europe. Instead of printing letters, his "typewriter" perforates a tape, and the tape then causes the transmitting machine at the left to send the message.

Morse's first receiver had a pen attached to the lever, which marked a strip of paper moved along regularly by clockwork. But it was found that messages could be read by simply listening to the clicking of the instrument, and the pen was discarded. In former days, the receiving operator wrote the message down, but now "telegraph printers" or "teletype writers" are used.

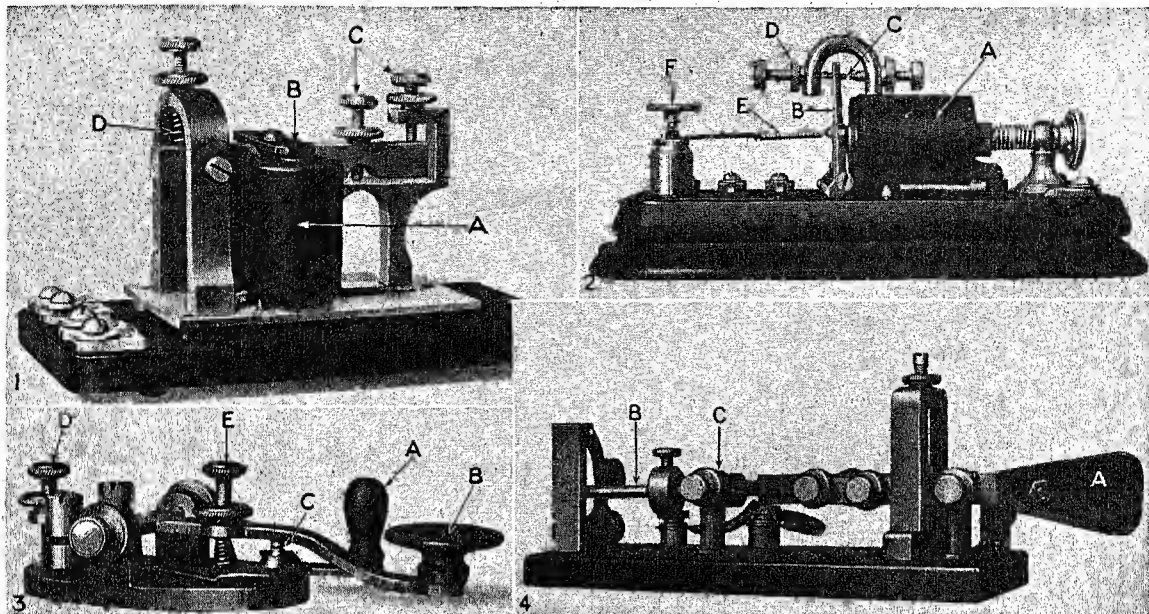
The sending operator working a telegraphic printer uses a keyboard much like that of a typewriter, a paper tape being perforated with a combination of small holes, usually five, one such combination for each character. These holes

pass under contact fingers, which send a corresponding combination of current pulses over the line. At the receiving end, the various combinations of current pulses cause an electrically operated typing machine to write the various letters either on a narrow tape, which is then pasted down on a telegraph form, or to print the message on a letter-size sheet of paper.

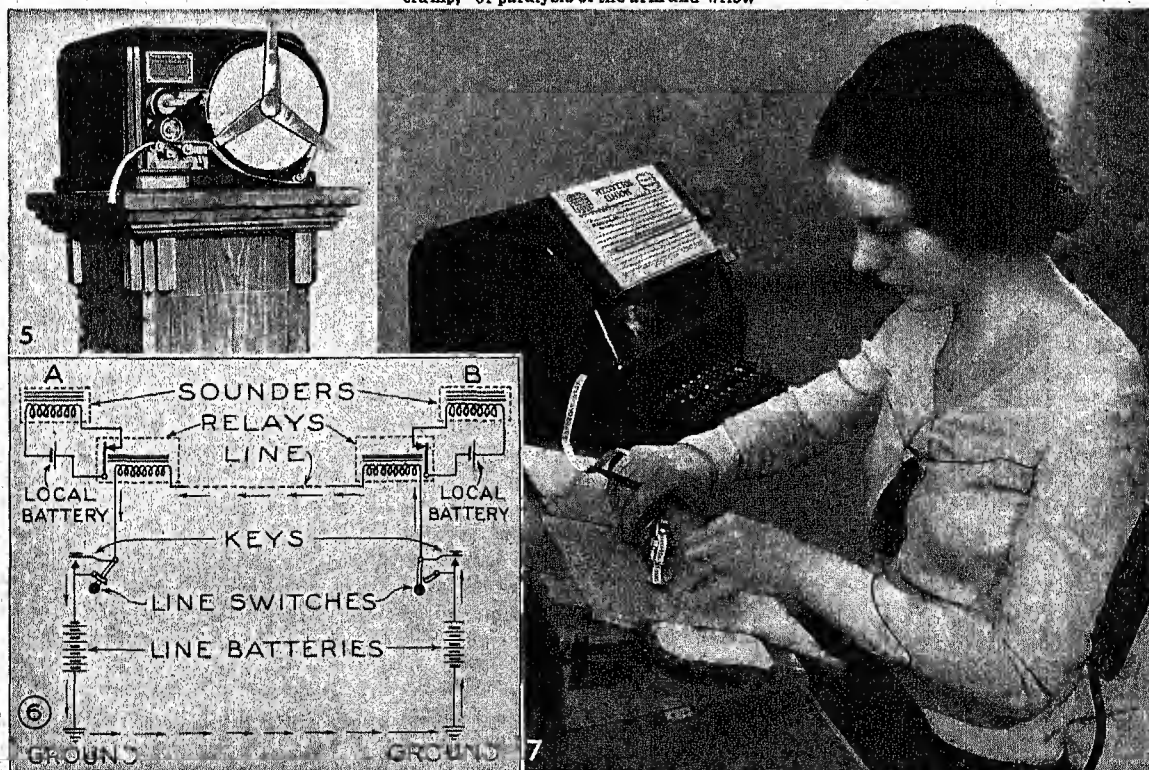
In sending a message more than a few miles, the electrical resistance of the wire becomes so great that the current is too feeble to operate the usual sounder. This trouble is overcome by *relays*. A relay is much the same in principle as a sounder, but its coils are wound with a great many more turns of wire, so that the relay is sensitive to feeble currents. The contacts on the armature make and break a local circuit, so that a strong current duplicating the feeble dots and dashes received, goes forth to carry the message along the next stretch of main line. A sounder in the local circuit will follow the signals in the main line.

Since telegraph lines are expensive to build and maintain, it is desirable to increase the carrying capacity of the wire as much as possible. One way of doing this is to speed up the transmission of the messages. A fast hand operator may send as many as 50 words a minute for a short time, but the automatic printers described are able to send from 80 to 350 words a

THE OLD AND THE NEW IN TELEGRAPHY



In the Morse sounder 1, current flowing through the coils A magnetizes their cores, attracting an iron armature B, thus pulling down a lever fastened to B to make a click. The stops C limit the motion, while a spring D lifts the lever when the current stops, making another click. In the relay 2, current in coils A pulls a light armature B to the right, closing a local circuit at C. An insulated stop D limits the motion, while a spring E and its tension adjustment F govern the armature. The Morse key is shown in 3. The knob A on a switch, is kept closed except when sending. Pressures on B make the dots and dashes at the contact C, and D and E are adjusting screws. The vibroplex, or "bug," is shown in 4. A pressure on A to the right makes a series of dots through the vibrator B and contact C. Pressure in the opposite way makes the dashes. These instruments are largely used to prevent "telegraphers' cramp," or paralysis of the arm and wrist.



The new "high-speed" ticker is shown at 5, while 6 is a diagram of the standard Morse circuit. B is sending to A, and the small arrows show the path of the current. At 7 we see the modern way of handling messages. The teletype machine in the background types the message on a tape, which the operator gums on a blank. When she wishes to send a message, she types it on the teletype keyboard, the machine transmitting the corresponding signals to a similar machine at the other end of the line. A typed record is preserved at the sending end also, being made by the machine on the narrow tape. Recently an "exchange service" has been inaugurated, whereby subscribers may be connected direct to each other. Messages are charged for by time used.

minute. Edison reached the practical limit of transmission with a single current, when he successfully dispatched 3,100 words a minute with a chemically treated tape.

More service can be obtained from a wire, however, by using electrical or mechanical methods of sending several messages at once. Edison invented three such systems. He used magnets sensitive to current passing in one direction but not another, and other similar devices. With his *duplex* system, one message could be sent each way at the same time on one wire. His *quadruplex* system doubled this capacity, and the *sextuplex* method tripled it.

Modern *multiplex* telegraphy depends upon a mechanical device which consists essentially of a pointer traveling at high speed over a metal circle. The circle is divided into eight insulated segments, and a transmitter is connected to each segment. As the pointer whirls, it catches the successive parts of each message in turn from the segments. At the receiving end, a pointer whirls at exactly the same speed and distributes the parts of the messages to their proper

segments on a receiving circle. From there the "unscrambled" messages go to printers which type them.

Additional messages can be loaded on the multiplex wires by using tuned carrier currents, somewhat like the carrier waves of radio. This method is particularly valuable when some news event swamps a small telegraph office with messages. The emergency is met by installing portable apparatus to handle the extra business by the carrier-current method. With a combination of all methods, four wires can be made to carry 120 messages at once.

Various special services are offered by telegraph companies. They lease wires at special rates to customers wishing to send their own messages. Pictures of handwriting, designs, and so on, called *facsimile messages*, are sent between some stations by telephotography (see Television and Telephotography).

Telegraph companies are classed as public utilities, and are subject to regulation by the Federal Communications Commission, established in 1934.

The telegraph wire mileage in leading countries is given with the entry Telephone in the Fact-Index.

TEACHING ELECTRICITY to TALK

The Magic Instrument that Carries the Human Voice over Hundreds and Thousands of Miles—How the Telephone Is Made and How It Works

TELEPHONE. Think of the wonder of an instrument that can pick up your voice and carry it over a space of a mile, 10 miles, even 3,000 miles, so perfectly reproducing every inflection and tone that your friend at the other end of the wire instantly knows it is *your* voice, even before you tell him who is speaking!

How is it done? Before you can understand that, you must recall that when you speak your voice sets up waves in the air, which spread in every direction just as waves do in water when you drop a pebble into a still pool. When you speak into the transmitter of the telephone these sound waves strike against a disk and set it also to vibrating in time with the waves. The disk forms part of a circuit carrying a current of electricity, and the electric current is strengthened and weakened by the different vibrations of this disk. This sets up electric waves in the wire that match the sound waves exactly. In this way the electric current virtually catches up the sound waves and bears them swiftly, almost instantaneously, to the other end of the wire, no matter how far that may be. There the electric waves pass through electromagnets. The variations in the electric current cause the magnets to attract an iron disk with varying strength, and thus make it vibrate exactly like the transmitting disk against which you talk.

This last transformation, of course, takes place in the receiver of the telephone at the other end of the wire. Your friend's ear is placed near this disk and the vibrations it causes in the air create the sensation we know as sound. Carried to your friend's brain by the nerves, the sounds are there translated into words.

and your friend understands what you are saying just as if you stood only a few feet from his side.

So accustomed are we, though, to this wonderful service, that we can hardly believe that when our grandfathers were boys, there were no telephones at all. It was only in 1875-76 that Alexander Graham Bell, in trying to send several telegraph messages over one wire, found a way to transmit speech by electricity (see Bell, Alexander Graham).

He was not the only man who had the same idea. In 1837 Charles G. Page of Massachusetts thought that electric current could be made to carry sound, but did nothing with the idea. About 1860 Philipp Reis, a German, devised an electric telephone, but could not develop it into anything practical; and Elisha Gray of Chicago invented a telephone at the same time Dr. Bell produced his. However, the Bell instrument was the one which became the father of the telephone as we know it today.

Just inventing the telephone, however, did not give us telephone service, by any means. The lines and equipment needed to give service are extremely costly; and while people everywhere were interested in the new instrument, they were slow to provide money in the large amounts needed to set up telephone service. So the men who believed in the telephone had many years of hard work persuading people to invest money and educating them to use the new device. But they persevered, and as the telephone came into greater use, the profits permitted extensions and improvements, and costs were lowered, until now the telephone is so inexpensive that practically everybody can afford

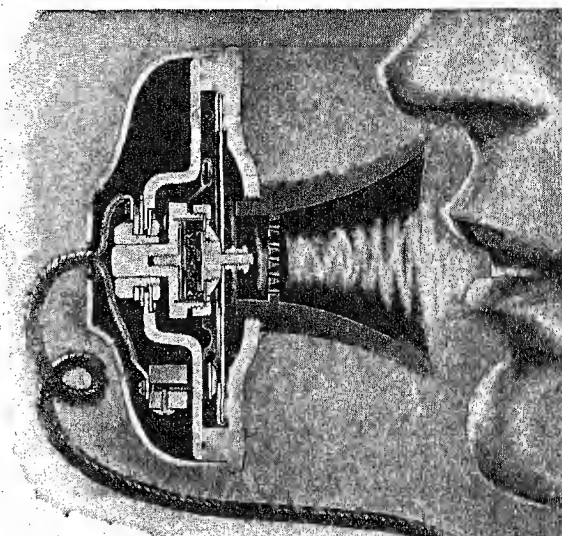
to use it. And as people learned to use it instead of running errands themselves or sending messengers, their habits gradually changed, until now, almost without our realizing it, the telephone has become one of the greatest single factors in the business and social life of today.

For that is exactly what it is. The telephone has changed our methods of doing business; it has made close neighbors of people living miles apart in the lonelier parts of the country; it has helped to change the whole idea of constructing business buildings; and has had much to do with the way in which even cities are built. Business men a thousand miles apart can now talk over the terms of a deal at almost any time they choose without leaving their offices.

No more important service has been rendered by the telephone, perhaps, than the linking of isolated families on farms into real communities. Farming used to be a lonesome occupation. For months in winter in most parts of the United States the farmer and his family would be almost held prisoners by the condition of the roads and would hear little of what was going on among their neighbors. Now almost every farming community has its telephone line and the various families are able to discuss their affairs, obtain information regarding the condition of the market, and visit whenever they like, regardless of the condition of the roads. This has resulted in making the farmers feel more neighborly with those about them and realize more than in the past that they have a common interest throughout the entire section of the country in which they live.

The telephone has come to mean much in the life of every family in the city, too. The doctor, the firemen, the policeman may be called so quickly in case of need that many lives are saved that might otherwise have been lost. And in ordinary times the grocer, the butcher, and the plumber can be given an order over the telephone and the housewife is saved a trip to the store. In purely social affairs, too, the telephone has assumed large importance. Nowadays it is only the more formal events for which written invitations are issued. It is so much quicker and easier merely to telephone and ask your friends to come.

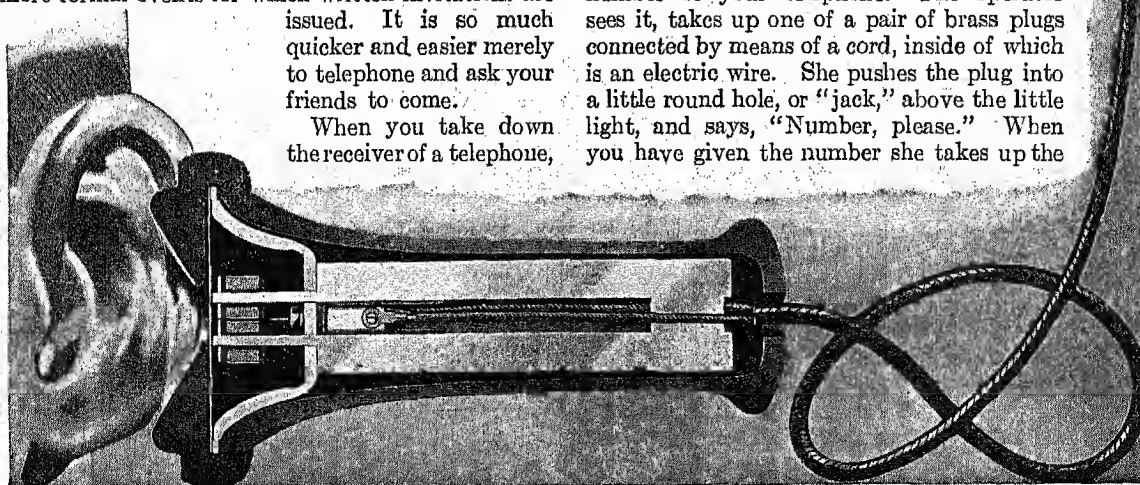
When you take down the receiver of a telephone,



HOW THE VOICE IS CARRIED

The vibrations of the voice pass through the mouth-piece, striking the metal diaphragm beyond and set it to vibrating in harmony. As the diaphragm vibrates, it communicates the motion to the button fastened at its center. This button is in contact with the fine grains of carbon which you can see in that small central container. The electric current passes through these grains—more current when the grains are compressed, less current when they are loosely packed. Therefore, you can see how the current would vary with every little compression from the diaphragm button. This variation of current strength is transmitted over the wire to the receiver. There the current passes through the coils of a small electromagnet, which acts upon another metal diaphragm. The pull of the magnet on the diaphragm depends, of course, on the strength of the current, and as this strength registers the infinitely small variations set up in the mouth-piece diaphragm, the receiver diaphragm is set to vibrating in unison, reproducing the sound of the voice in the ear of the listener. To make the illustration simpler, the manner in which the electric current is introduced into the circuit has been omitted.

a tiny light glows on a switchboard, in front of which an operator sits, in the "central" office or "exchange." This light is placed under the number of your telephone. The operator sees it, takes up one of a pair of brass plugs connected by means of a cord, inside of which is an electric wire. She pushes the plug into a little round hole, or "jack," above the little light, and says, "Number, please." When you have given the number she takes up the



plug that is the companion to the first one, and touches it to the edge of a hole bearing the number you have asked for. If she hears a clicking sound she knows that line is in use and tells you, "Line is busy." If no sound is heard, she pushes the plug into the hole and presses a button that rings the telephone bell at the place you are calling. As soon as the receiver there is lifted, the final connection is automatically made and a conversation can be carried on.

That is all there is to it if the number you are calling is in the same exchange as your own. But in large cities there will be several exchanges having names like "Main," "West," and so on. If your telephone and your friend's are in different offices, your operator presses a button which enables her to talk over a special line to an operator in your friend's exchange. The connection is completed as explained beneath the picture on another page.

In the early days of the telephone the "switchboard," by means of which these connections are made, was exceedingly crude. Today it is the very heart of the telephone service, and, thanks to hundreds of inventions, is able to provide connections for as many as 10,000 lines. Each one, with its millions of soldered connections and hundreds of parts, requires two years to be built and installed.

Perhaps the most wonderful work with a switchboard comes when an exchange has grown so that another board is needed. The board is set up, and, without disturbing the old board, all the lines are connected as they will be when the new board is in service. When everything is ready, at a given signal workers cut all the old connections involved in the change, and the new arrangement is "in service," without any trouble to the users.

The telephone central office is an intensely interesting place. Many of the larger ones have 50 or more young women operators sitting at the switchboard "positions." Each one wears a headset, consisting of a receiver held to her ear by a clamp over her head, and a special transmitter, suspended from her neck in position for instant use. The face of the switchboard is somewhat like a honeycomb with its many little holes, while the tiny lights flash here and there over its surface like fireflies, the operator responding to every one of their silent calls. But with all the busy traffic of connections asked for and given, questions asked and answered, there is no real noise in a big telephone exchange.

The miles upon miles of wire making up the trunk lines and subscribers' lines in a great city are not seen in the business district. There they are carried underground in conduits. Out in the less congested sections of the city and in the suburbs, they generally emerge from the earth and run through cables held up by tall poles. At intervals the cables are brought into iron boxes, and lines are taken off for near-by subscribers. In addition to the telephone system in each city or

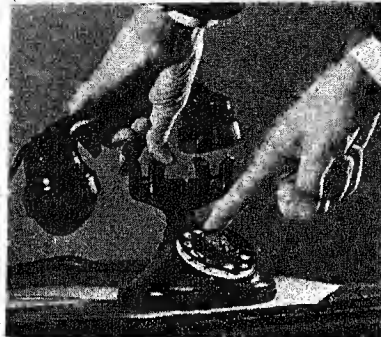
town there are long-distance lines which tie all the separate systems into one. If a New York City subscriber, for example, wants to talk to a subscriber in Chicago, he asks his local operator for "Long Distance." The long-distance operator gets the Chicago subscriber's telephone number from a directory, and asks a Chicago long-distance operator to make the connection. More than 90 per cent of such calls are completed while the caller holds the wire.

Weakening of transmission due to distance is overcome by vacuum tube repeaters, which release a strong duplicate of the message into a further stretch of line, and so American subscribers can now talk to nearly all stations in the United States, Canada, and Mexico. Radio links give connection with Europe, South America, and Australia, with many regions in Asia and Africa, and with Bermuda, Iceland, and most of the Caribbean Zone. Many Atlantic liners can be reached by telephone, and service is being extended to ships on the Pacific

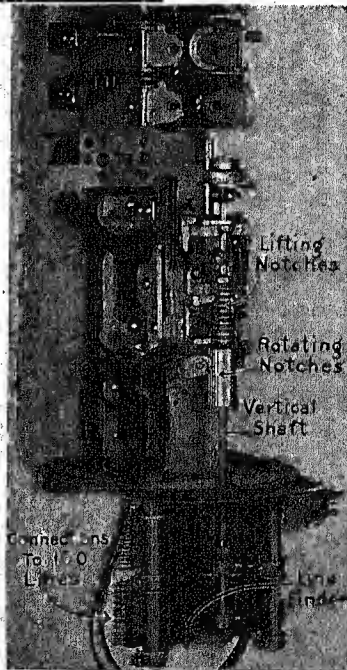
Ocean. Ingenious devices "scramble" the conversation during radio transmission to prevent listening in. This is done by sending successive portions on different wave lengths, then reuniting the portions on one circuit.

In busy centers, machine-switching, or "automatic," systems are replacing operators and hand-operated switchboards. Subscribers obtain connections by turning a dial on their telephones. Operators are still needed, of course, to handle long-distance calls and for special calls of all sorts. The carrying

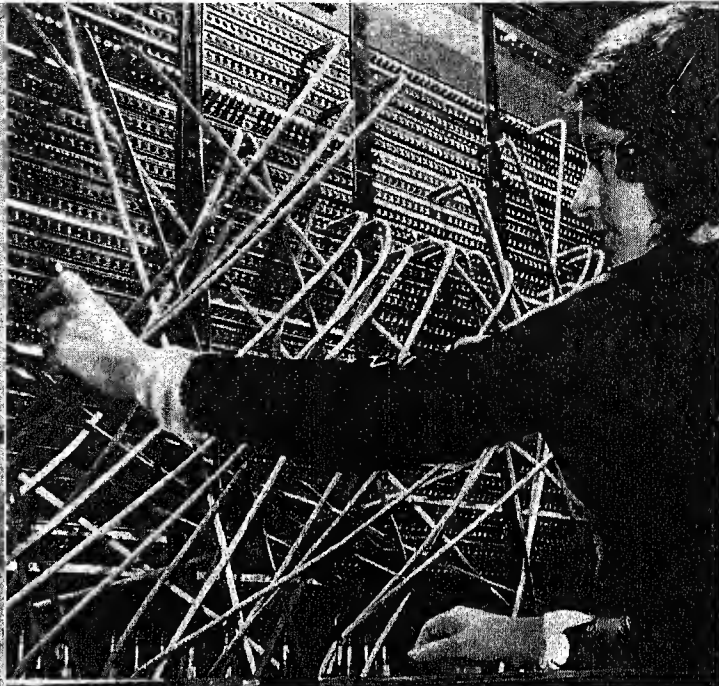
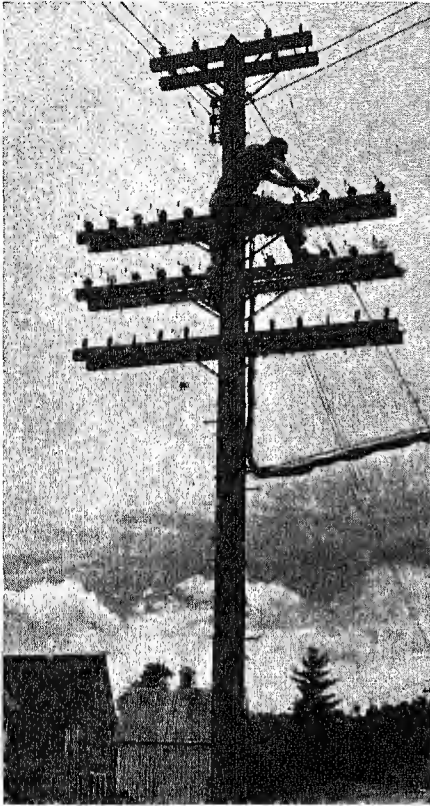
DIALING A TELEPHONE NUMBER



In an automatic telephone, as the dial spins back after each turn of the finger, it sends out electric impulses. The number of impulses corresponds to the number or letter of the hole in which you put your finger. At "central," the first sets of impulses cause rods to lift the appropriate number of switches; the later impulses throw selected switches in the line finder, and the job is done.



TWO KEY WORKERS IN THE HUGE TELEPHONE ARMY



At the left is a telephone lineman going about his job. He is one of the many thousands in the land who work by day or night, in heat, cold, or howling storm, to keep the lines open. At the right is an operator on a large city's "toll tandem switchboard." She receives requests from long-distance operators for lines to small outlying towns. She selects the cord which will carry the requested call from her city, and plugs it into a *jack* (or hole) connecting with the desired point.

capacity of existing wires in long-distance service is being increased by using tuned circuits that resemble the carrier-wave circuits of radio. In this way many conversations can be carried on at the same time over the same wire, since each carrier current can be separated from the others by proper tuning.

Some Statistics

The growth of the telephone system has been prodigious. Over 20 million telephones are used in the United States in busiest years. This is more than half the total in the world. Nearly all American telephones are connected with the Bell System, and through it to about 95 per cent of all the telephones in the world. The Bell System has more than 80 million miles of wire. Its equipment is worth between 4 and 5 billion dollars. In some years it employs 300,000 people.

Few countries are provided with telephone service comparable to that of the United States, which leads

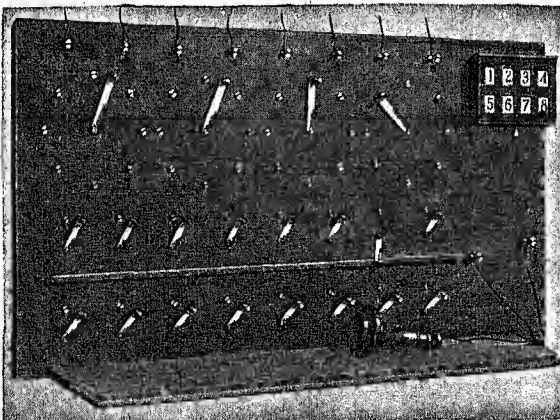
the world with about 15 telephones for every 100 inhabitants. Canada, New Zealand, Sweden, and Denmark are close behind, with 11 or 12 telephones to

every 100 people. These ratios vary as business conditions change.

Excellent as American telephone service is, highly paid experts are constantly at work seeking improvements. One result has been to revolutionize public speaking by "public address" systems. Engineers install a microphone, amplifying apparatus, and loudspeakers; and a man can then address an audience of any size. A similar development is "conference service" connecting two or more offices. Tele-

phone engineers are also working to make television practical, and to improve the transmission of pictures over telephone circuits and by radio. (For world telephone statistics, see Telephone in the Fact-Index. See also Electricity; Radio; Sound.)

THE FATHER OF SWITCHBOARDS



Contrast this, the first commercial telephone switchboard, with the modern installation above. This board, set up in 1878 at New Haven, Conn., had eight lines and served 21 telephones.

The MAGIC GLASS *that* HELPS US FIND NEW WORLDS

TELESCOPE. When Galileo, using a telescope he had made in 1610 from descriptions of one invented in Holland two years before, first scanned the heavens, it was—in the words of an eminent American astronomer—"an adventure comparable to a voyage across an unknown sea, and the discoveries made with it were as marvelous as the new lands which Columbus and his followers found by sailing westward from Europe." For on the first night he used his telescope, Galileo discovered three of the four moons of Jupiter, and later he observed the rings of Saturn, the mountains and plains of the moon, spots on the sun, and its rotation on its axis.

In essential elements the telescope is simply (1) a convex lens (the "objective") or a concave mirror (the reflector or "speculum") set in one end of a tube to focus the light from a distant object, producing a bright image; and (2) a lens called the "eyepiece" to magnify this image and bring it to the eye. If the telescope has a convex lens (objective) it is a "refracting" telescope; if it has a speculum, it is a "reflecting" telescope. The refracting telescope is the older type; and while Roger Bacon about 1280 showed that he had sound ideas about the theory of such a telescope, and opticians in Holland actually made such instruments a year or two before Galileo, the credit for the invention is usually given to this great Italian astronomer.

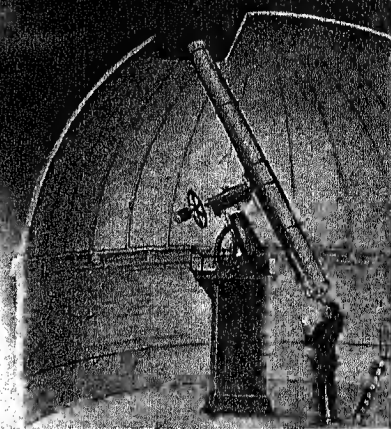
How a Refracting Telescope Works

When the telescope is pointed at a star, the light rays enter the telescope as essentially parallel lines. They are brought to a focus (F) by the objective (O), and then pass through the eyepiece (E), and emerge again in parallel lines. But the *large* cylinder of rays which enters through the objective is condensed to a *small* cylinder by the time it emerges from the eyepiece. Consequently many more rays of light enter the eye than would enter without the telescope, and this has the result of greatly increasing the apparent brightness of the star. So we may say that the effect of a great telescope such as that of the Yerkes Observatory, with its 40-inch objective, is to give a pupil to our eye which is many thousand times as powerful as our natural one!

Early refracting telescopes were subject to two serious drawbacks. The images they produced were

distorted, first, because the rays passing through the margin of the lens were brought to a focus before the others (spherical aberration), and second, because the blue rays were brought to a focus before the red (chromatic aberration). It was almost 150 years before an English optician discovered that these defects could be overcome by making the objective of two pieces of glass, the outer piece convex and made of crown glass, and the inner concave and made of flint glass. Meanwhile the reflecting telescope, invented in 1669 by Sir Isaac Newton, had come into use.

In the Newtonian reflecting telescope the light passes the entire length of the tube to a curved mirror, called the "speculum," which reflects the rays back in the shape of a cone to a prism or diagonal reflector. The prism diverts the rays at right angles to an eyepiece at the side of the tube. Such a telescope is free from chromatic aberration, but the position of the eyepiece makes it more awkward to use. In another form of reflecting telescope, the Cassegrainian, the cone of rays reflected from the speculum is intercepted by another curved mirror placed near the other end and reflected back through a hole in the center of the speculum to the eyepiece.

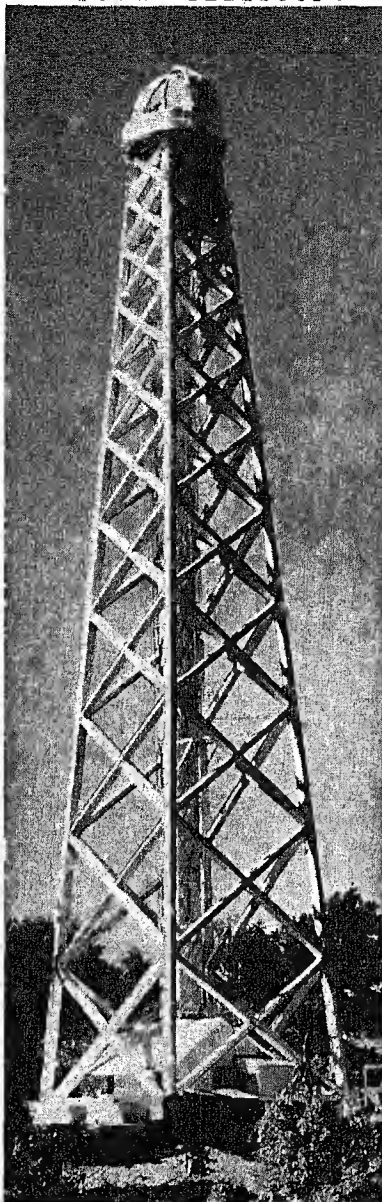


Both reflecting and refracting telescopes are used in modern astronomical observatories. The advantages of the reflector are its cheapness and its perfect "achromatism" (freedom from outside colors), while the main advantage of a refractor is its permanence and freedom from trouble after once being well adjusted. The world's largest telescope is the 100-inch reflector at Mt. Wilson, Calif. A 200-inch telescope is now being built, which will have four or five times the light-gathering power of the 100-inch instrument and is expected to show more than 2,000,000,000 stars.

The magnifying power of a telescope is expressed in diameters. The focal length (*see* Lens) of the objective or speculum, divided by the focal length of the eyepiece, gives the magnifying power, and every telescope has eyepieces giving various powers. Why not use always the highest power possible? Because imperfections are magnified with the image, and the image loses in brilliancy as it gains in size. Consequently, a faint object can only be magnified up to a certain degree, because further magnification would make it too dim to be seen well. The mammoth Yerkes 40-inch refractor can be used advantageously to give 1,000 diameters, and higher powers are possible.

The most important part of a telescope, a great astronomer says, "is the man at the small end." Next in importance is the objective lens or the speculum; this must be made with almost miraculous precision. The surface must be accurate to a few millionths of an inch, and months, even years, of painstaking labor are required

A TOWER TELESCOPE



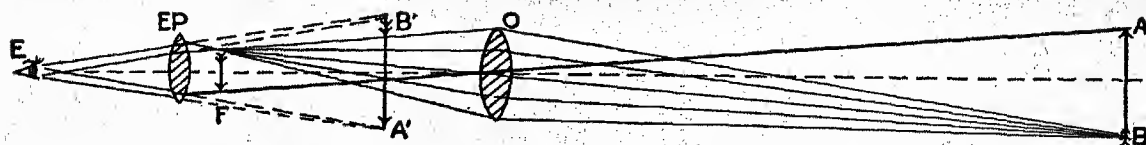
The instruments are fixed on the ground, and a mirror in the top of the tower reflects the image of the sun down the tube to them. The tower is part of the Mt. Wilson Observatory.

to cast and polish a single objective (*see* Glass). So sensitive to changes of temperature is the great 9,000-pound 100-inch mirror at Mt. Wilson, Calif., that the gigantic dome is insulated to keep out the heat. The mounting and controlling mechanisms of telescopes are also marvels of human ingenuity (*see* Observatory). Many modern telescopes are so constructed that measurements of objects and spaces in the field may be made in thousandths of an inch, by means of the micrometer (*see* Micrometer).

In all astronomical telescopes, the image seen at the eyepiece is inverted. In the smaller telescopes or spyglasses to be used on land, an additional lens or system of lenses has to be introduced to re-invert the image, so that it is seen in the same position as the object. The opera or field glass is a pair of small telescopes with concave lenses for the eyepieces. The most efficient and modern instrument of this type, called the prism field glass or "binocular," has two reflecting prisms in each tube. This gives it as much magnifying power as could be obtained with an ordinary field glass three times as long, besides permitting the use of a better type of eyepiece which gives a much larger field of view with better definition.

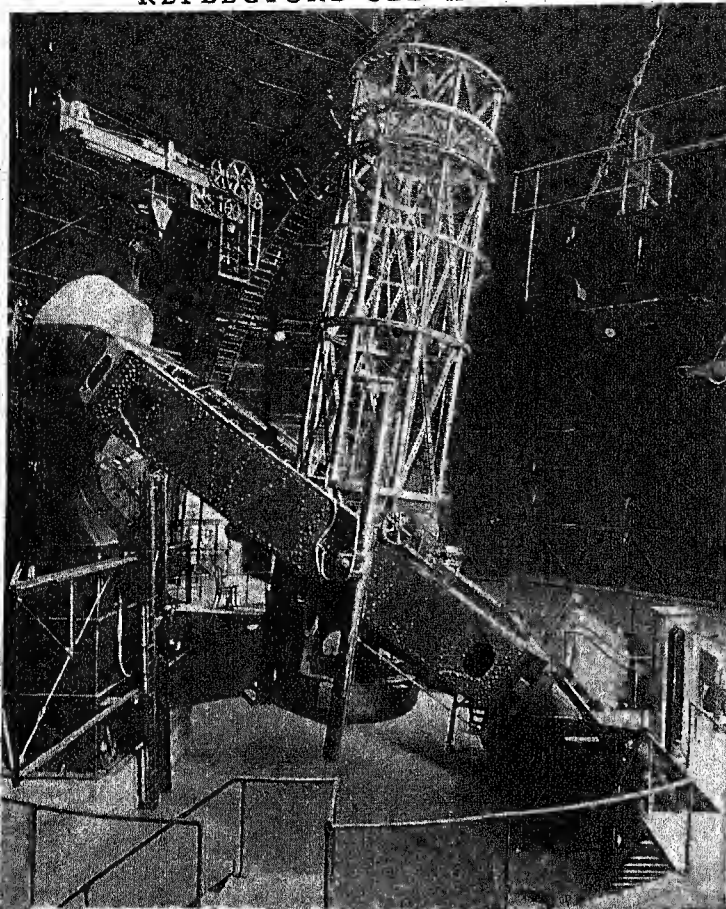
Since few persons have perfect eyes, or the same defects in both eyes, most high-grade binoculars and field glasses have a means for adjusting the eyepieces separately to compensate for the differences.

Telescopes of many kinds are incorporated in a large number of instruments, such as surveyors' levels and transits, range finders, rifle telescopic sights, and even in delicate precision laboratory



This diagram illustrates how the astronomical telescope works. Let us suppose we are viewing the moon or one of the planets, represented by the arrow (AB). The object glass (O) brings the image of AB to an inverted focus at F, where it is viewed by the enlarging eyepiece (EP), which represents it to the eye as though it were a large near object (B'A'). The radiating lines from B indicate how light rays are focused by the object glass. Viewed with the naked eye, comparatively few of the rays from B would be seen, but with the lens (O) in the way, virtually all the light from B which strikes the surface of that lens is brought together again at the upper end of F. The larger the lens, of course, the more light it collects and the more powerful it is for astronomical purposes.

REFLECTORS OLD AND NEW



The huge 100-inch Mt. Wilson telescope, above, is so delicately poised that it can be moved by a touch. The instrument really floats on mercury, and the cylindrical housings at the ends of the axis contain two spherical thrust bearings which carry virtually no load, but merely keep the big instrument "lined up." Notice the circular top of the hydraulic jack under the mirror mounting, on which the mirror is lowered for resilvering.

balances, where all readings and manipulation must be made from a distance to avoid disturbances due to the heat of the worker's body.

While the Hooker reflector at Mt. Wilson was long the largest telescope of any kind, at least two such instruments superior to it in size are under way. These are a 105-inch telescope in France, and a 200-inch giant for the California Institute of Technology.

The latter telescope is planned for a tube more than 20 feet in diameter, the mirror being 16 feet 8 inches wide and weighing about 20 tons. The total weight of the telescope and mounting runs over 450 tons.

The 100-inch telescope has a mirror 8 feet 4 inches in diameter, weighing about 5 tons. Twice a year it is lowered on a hydraulic jack through the floor to be resilvered. Some idea of the delicacy of this operation may be gathered when we remember that the surface of such a mirror is finished to a few millionths of an inch; one careless motion, one false movement, in polishing the surface would ruin a costly instrument.

The grinding and polishing, or "figuring," of such lenses imposes a terrific strain on the workers. It is not unusual, in figuring a large lens, to polish for three minutes, and then wait for an hour while the glass cools from the heat given it by the delicate polishing operation. Much more time is spent in cooling and testing such surfaces than goes into the actual polishing.

The largest telescopes must be of the reflecting type, since the practical limit of casting a large refractor seems to have been reached in the 40-inch lens of the Yerkes telescope. These lenses are made of several pieces of glass, and their weight mounts enormously when their size is increased. Aside from the great difficulty of grinding and polishing large lenses of this type, their own weight would cause serious distortion when mounted, so that they would be useless.

The latest design for large reflecting mirrors is a built-up one; that is, the mirror is built up of glass "girders" and supports, cemented to the actual thinner glass on top, which is "figured" to make the mirror. The great 105-inch mirror designed in France is of this type, which can be made much lighter and with a greater degree of certainty.

When completed, it is expected that the 200-inch telescope will penetrate more than three times as far in space as the 100-inch instrument, and permit the exploration of a sphere having 30 times the volume of that now known to astronomers. The

study of distant nebulae, now limited by the present telescopes, will be tremendously aided. With modern telescopes, cameras and spectroscopes have practically replaced the old-time observer.



The errors of early refracting telescopes led Sir Isaac Newton to invent this, the first reflecting instrument. Its size may be judged by comparing it with Newton's book, 'Principia'.

SEEING Around the World by WIRE and RADIO

TELEVISION AND TELEPHOTOGRAPHY. After the World War of 1914-1918, newspapers began printing pictures of far-away events the day after they occurred. An explanatory line said, "transmitted by wire." Immediately people began hoping for the day when they could sit before a screen and watch events as they occurred—that is, they hoped for *television*, or "distant seeing," which would do for events and action what *telephotography* had done for pictures.

This hope was not impractical, because inventors had already made a good start toward achieving television. In 1873 Willoughby Smith had noticed that selenium conducts a stronger electric current when more light strikes it. In 1884 Paul Nipkow of Germany used this property for television by wire.

In front of the scene to be transmitted he set a whirling disk pierced with tiny holes in a spiral pattern. The disk revolved 20 times a second. At every revolution, light from each point in the scene passed through one of the tiny holes and fell upon a selenium cell. This is called "scanning." The selenium cell changed the strength of an electric current according to the strength of the light it received through the holes. Thus the current carried, 20 times a second, a complete record of the lights and shades of the scene. At the receiving end, the current controlled the intensity of a light which passed through holes in a similar whirling disk and thus reconstructed on a small screen a series of images of the original scene, so rapidly repeated that they had the steadiness of a motion picture (see Motion Pictures).

The images remained feeble, however, and limited in range until 1925, when C. Francis Jenkins and John L. Baird amplified them with vacuum tubes. Thereafter

the cathode-ray oscilloscope, described in the article on Electronics, replaced the perforated disk for receiving; and between 1924 and 1933 Vladimir Zworykin developed the iconoscope for scanning. Similar devices were invented independently by Philo T. Farnsworth and by Dr. François Henroteau.

The iconoscope and its relatives make use of the fact that metal particles emit electrons when struck by light. This behavior is called the *photoelectric effect*. This emission leaves each particle with a positive electric charge. But if a beam of electrons strikes it, the particle recaptures electrons, and therefore loses its charge. (See Photoelectric Devices.)

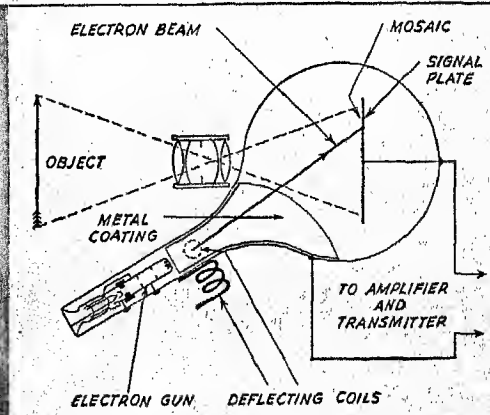
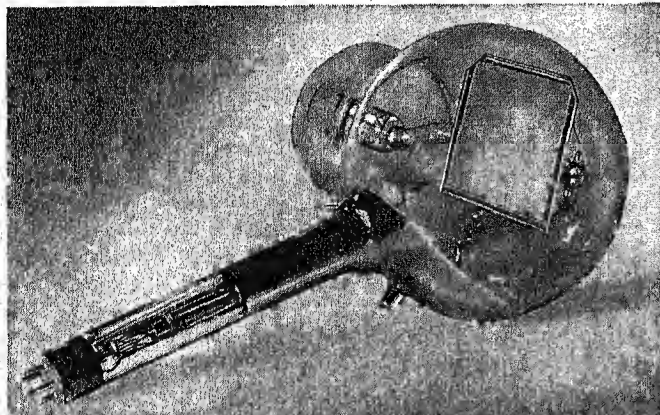
The picture and diagram below show how this phenomenon is used in the iconoscope to produce an electric current of varying strength. The variations may be transmitted to a receiver either over a wire or on a radio carrier wave (see Radio).

In the receiving instrument, a cathode ray or electron beam moves back and forth over a screen, exactly as the scanning beam moves, and this beam varies in strength with the incoming signals. The screen is made of material which fluoresces, or glows, when the beam strikes it, and the glow varies in proportion to the strength of the beam. Thus the receiving screen reproduces the image on the sending screen. In another method, called *frequency modulation*, the movement of the beam is controlled, and the glow varies in proportion to the length of time that the beam remains on each point.

Point-to-Point and Broadcast Television

Today point-to-point television over wires is made practical for small pictures by using a *coaxial* cable. Such a cable has a conductor suspended inside a me-

THE INSTRUMENT WHICH "SEES" FOR TELEVISION

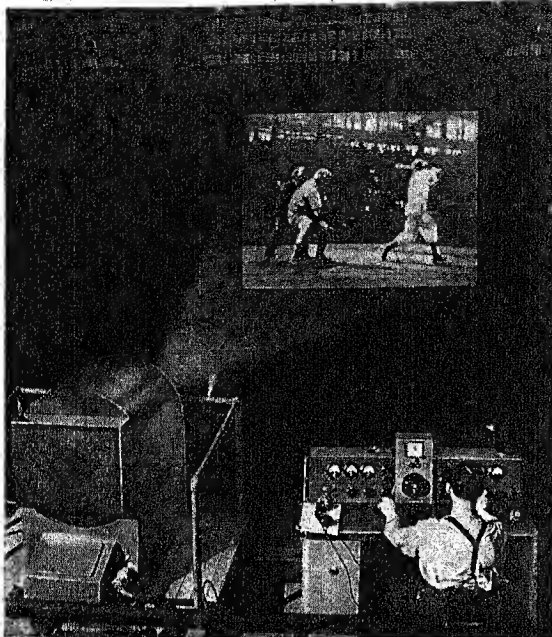


Above are an iconoscope and a diagram of its parts. Rays of light from the object strike a layer (called a mosaic) of tiny silver particles, which are imbedded in an insulating medium on the signal plate. As explained in the text, each particle becomes electrically charged in proportion to the strength of the light that falls upon it. The charges in turn cause a total charge upon the signal plate and upon the metallic coat-

ing in the neck of the iconoscope, just as though these parts were plates of a condenser. Meanwhile, the electron gun is sending out a beam of electrons, and the beam is swept across the mosaic from side to side by a changing current in one magnetic deflection coil. The beam discharges each particle it strikes; and each discharge in turn sends a proportional current between the signal plate and the metallic coat-

ing. When one "line" has been scanned in this way, a second deflecting coil, set at right angles to the first, moves the beam down a trifle, and another line is scanned. This action is repeated fast enough to scan the entire mosaic about 20 times a second; and thus each particle gives 20 "electrical reports" a second on the amount of light falling upon it. These reports are amplified and transmitted to the receiving apparatus.

WATCHING THE GAME BY TELEVISION



At the baseball park a scanning machine is watching the game and sending what it "sees" to this receiving set which projects the action upon a full-sized movie screen. The operator at the instrument board controls the focus of the projector.

tallic tube with pierced insulating disks. The electrical impulses are screened off from interference from outside the tube. A coaxial cable was installed in 1936 between New York and Philadelphia.

In theory, television broadcasting requires nothing beyond the use of a carrier wave instead of a cable. Several practical difficulties, however, exist. Sounds can be broadcast by sending only 10,000 changes of current strength a second. But for television a million changes or more a second must be sent; and this can be done satisfactorily only by using correspondingly short, high-frequency waves. Short waves are not

reflected from the Kennelly-Heaviside layer in the sky so satisfactorily as longer waves; and the range of an ultra-short wave transmitter is only between 25 and 50 miles, depending on the height of the antenna. Hence television programs can be transmitted to distant points only by the use of coaxial cables or by a system of relay stations.

Since about 1930, television programs have been more or less regularly broadcast in England and other European countries, and receiving sets have been on the market. In the United States, though experimental work was no less vigorously pushed, commercial broadcasting and sale of receivers were delayed until some of the major problems could be solved. The chief of these was providing a method for simultaneous broadcasting from several stations, so that sufficient revenue could be obtained from advertisers to meet costs.

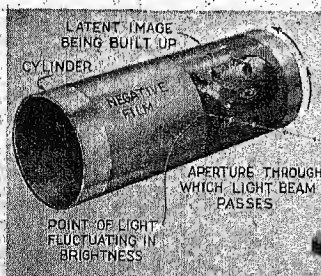
Another problem was to adopt a standard system of transmission, so that buyers of receiving sets might be sure their sets would remain useful for some years. When a standard code was adopted in 1941, commercial broadcasting began. This code calls for scanning an image 4 x 3 inches with 525 lines. This gives better detail than the half-tones in magazines. These commonly use screens with 120 lines to the inch (see Engraving and Etching). When this image is received it can be enlarged, with some loss of detail, up to a size which can be shown on a theater screen. Accompanying sound is sent by frequency modulation. Each broadcast requires a radio band with a range of $4\frac{1}{2}$ or 5 megacycles.

Telephotography of Pictures

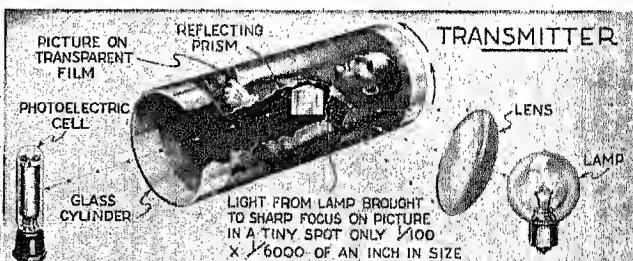
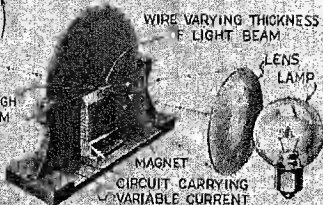
Transmission of still pictures by wire or radio is much simpler than television, because the picture is scanned only once and as slowly as desired. The method used is shown below by pictures. Since 1935 many cities in the United States have been connected by special wires to transmit newspaper pictures regularly. Communication companies now offer facsimile transmission of messages and documents, especially figures, formulas, and signatures.

HOW PICTURES ARE "TELEGRAPHED"

These illustrations show how pictures are sent by telegraph. In the transmitter at the right, the print revolves on a cylinder and causes a light beam of varying strength to strike the photoelectric cell. The cell emits a varying current, which is sent to the receiver. In the receiver, the wire which is placed above the magnet blocks the passage of light when it is at rest. The varying electric current from the transmitter enters the magnet and draws the wire more or less completely aside. This allows more or less light to strike the rotating film, and builds up, bit by bit, an exact copy of the picture. At the right is a facsimile message in Chinese writing.



RECEIVER



New York City Jan 30
Suen Hong
 736 Grant Ave.
 San Francisco, Cal.
 濟海安報傳憑

HOW THE CRUEL GESSLER CAME TO HIS DEATH



The legend of William Tell is told in folk lore with many different endings. According to the version pictured here, Gessler continued oppressing the people, and Tell was called upon to rid them of the tyrant. Lying in wait for Gessler along a forest road, he shot and killed the bailiff with his crossbow.

TELL, WILLIAM. Early in the 14th century, legends say, the village of Altdorf in Switzerland was ruled by the tyrannical Austrian governor, Gessler. One day he set up a pole upon which he placed a hat—to symbolize Austrian power. All the people were ordered to pay homage to it, as though it were their ruler, the duke of Austria.

One of the villagers, a skilled crossbowman named William Tell, refused to do this. The Austrian soldiers took him and his son Walter before the tyrant.

Gessler smiled, and said to Tell, "I hear that you can shoot an apple from a twig at a hundred paces. I want to see you do it. But I shall set the apple on your son's head, and then you shoot."

Tell turned pale and said that he would rather die. "You shall shoot," said Gessler, "or you and the boy shall both die. Bind the boy to a tree," he ordered.

Walter let himself be bound and stood without a quiver. He knew that his father would not miss the

mark. Tell took an arrow from his quiver, examined it carefully, and slipped it under his belt. Then he took another and fitted it to his bow. All were breathless as the shaft sped through the air and pierced the heart of the apple.

"A good shot!" cried Gessler who watched with a wicked smile. "But for what was the other arrow?"

"To slay you, tyrant, had I killed my son," was the reply.

In a rage Gessler commanded his soldiers to seize and bind Tell, and carry him to a prison across the lake. But during a storm which arose Tell escaped, and soon after he slew the tyrannical governor. The legend places these events in the year 1307, and it was soon after this, in 1315, that the men of the three forest-cantons—Uri, Schwyz, and Unterwalden—defeated an invading Austrian army and then renewed and enlarged the Perpetual League, which laid the foundations of Swiss independence.

Though the story of William Tell was long accepted as historically true, it is now known that it is merely one of those great patriotic legends that grow up in every land. The story of an archer who shot an apple from his son's head is found in at least five places outside of Switzerland, and the answer which the archer gives the tyrant is in each case about identical with that given Gessler by Tell. In Swiss literature the story is first found about 1474. Records of the district about Altdorf show no trace of a governor named Gessler. The German poet Schiller used the legend in his drama 'Wilhelm Tell'.

TEMPERANCE. At first "temperance" meant merely the movement to secure moderation in the use of intoxicating drinks. Gradually its scope extended to include total abstinence from their use ("teetotalism"). The first temperance society in the United States was formed at Litchfield, Conn., in 1789, by 200 farmers who pledged themselves not to give strong liquors to workmen engaged in carrying on their farm work. Early in the 19th century the churches took a hand. The Massachusetts Temperance Society was begun in 1813, and the American Temperance Union in 1826. The early societies were temperance societies, but not total abstinence societies. They did not object to the use of wine, cider, or malt liquors. The temperance reformers even built a brewery in Boston as a means of combating the use of distilled liquors. The first national temperance convention met in Philadelphia in 1833, and formed a national temperance union, with 23 state societies and over 7,000 other societies as members. The temperance cause had a great set-back during the Civil War when through preoccupation with other questions the people for the time lost interest in the subject. After the war, the growth of breweries and the starting of many attractively decorated and well furnished saloons brought the temperance question again before the people.

Most temperance organizations in the United States came to include in their program not only total abstinence but also rigid control of the liquor traffic and its suppression by either local option or national prohibition. Thus the temperance movement became identified in large measure with the prohibition movement. (See also Prohibition; Woman's Christian Temperance Union.)

'TEMPEST, THE'. On an island in the Mediterranean Sea, according to this romantic play by Shakespeare, lives an exiled duke of Milan, Prospero, with no companions save his lovely daughter Miranda, and his books of philosophy and magic. By his magical knowledge, he brings into his service an ugly, half-human creature called Caliban, and the fairy spirit Ariel. One day Prospero discerns a ship blown toward the island, and knowing by his magic that the King and the Prince of Naples, as well as his own false brother, the usurper of his dukedom, are on board, he sends Ariel to wash them into the sea and land them safely on different parts of the island. It is Prospero's hope to bring about a marriage between Miranda, whom he has tutored with care from her infancy, and the young Prince of Naples. To his great joy not only do the youthful pair, as soon as they meet, fall to adoring each other, but the King himself is delighted and restores to Prospero his dukedom. Some people like to think that Prospero is Shakespeare, who with this play laid down his pen forever, as Prospero, at the end, breaks his magic wand and sets free the delicate powerful spirit, Ariel, or Imagination, who sings in sweet and lilting tones:

Where the bee sucks, there suck I:
In a cowslip's bell I lie;
There I couch where owls do cry.
On the bat's back I do fly
After summer merrily.
Merrily, merrily shall I live now
Under the blossom that hangs on the bough.

The "VOLUNTEER" STATE—Its Corn, Cotton, and Coal

TENNESSEE. A long narrow strip of land, wedged in among eight other states, Tennessee extends 448 miles from the Mississippi River eastward into the Appalachian mountain system. Its surface is remarkably diversified, falling into three divisions, east, middle, and west Tennessee. The Cumberland Plateau, a continuation of the great Appalachian Plateau, marks the division line between east and middle Tennessee, and Lower Tennessee River separates middle and west Tennessee.

East Tennessee is a valley 30 to 60 miles wide, the southwestward extension of the great Appalachian valley. It lies between the steep slope of the Cumber-

Extent.—East to west, 448 miles; north to south, 116 miles. Area, 42,246 square miles. Population (1940 census), 2,915,841.

Natural Features.—Great Smoky (Unaka) Mountains, along the eastern border, separated from the Cumberland Plateau by the valley of the Tennessee (highest point, Clingmans Dome, 6,643 feet); central and western Tennessee, rolling country and plains, sloping to the Mississippi. Chief rivers: Tennessee, Cumberland, and Mississippi. Mean annual temperature, 59°; mean annual precipitation, 50".

Products.—Corn, wheat, hay, tobacco, fruits, vegetables; cattle, dairy products, hogs, poultry; lumber products, iron and steel, textiles, cottonseed products, flour, other food products, chemicals; coal, zinc, copper, marble, phosphate rock, clay, cement.

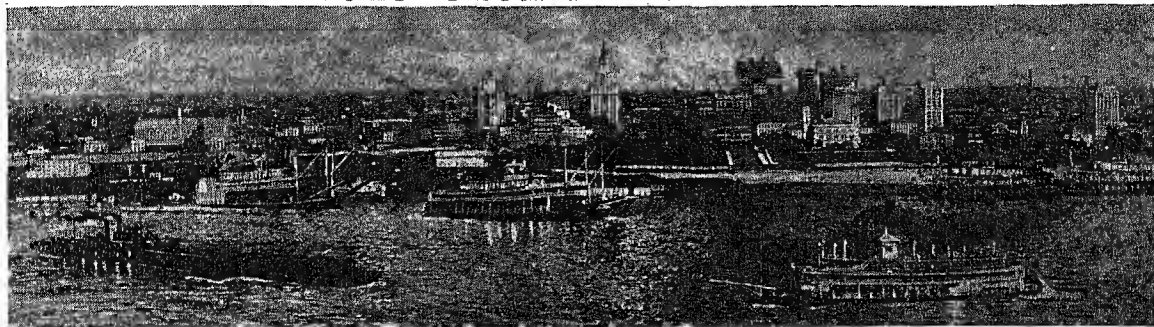
Cities.—Memphis (292,942), Nashville (capital, 167,402), Chattanooga (128,163), Knoxville (111,580).

land Plateau on the west, and on the east the Unaka or Great Smoky Mountains—where rugged, forest-covered peaks and deep ravines are preserved as a national park. Minor ridges and valleys furrow east Tennessee.

Portions of the mountainous sections are unproductive, but most of the eastern valley is as fertile as the rich lands of middle and western Tennessee.

Two of the large cities of the state are in this valley, Knoxville, near the center, and Chattanooga, near the southern border. Located in the heart of hardwood, coal, marble, copper, and zinc-producing sections, Knoxville has recently gained great commercial and

MEMPHIS FROM THE WATER FRONT



From Memphis to the sea, deep-water navigation on the Mississippi is possible all the year around. This makes the city the metropolis, not only of Tennessee, but of the whole Mississippi Valley between St. Louis and New Orleans.

industrial importance, nearly tripling its population between 1910 and 1930. Great textile and clothing mills, iron and steel plants, furniture and lumber factories, and the many marble quarries keep the workers of Knoxville busy. This thriving metropolis has grown around a small fort built by Gen. James White in 1786 to guard the settlers from hostile Cherokee. Eighty miles southwest on the Tennessee River is Chattanooga. As a gateway between Tennessee, Alabama, and Georgia, this city was a strategic point in the Civil War (*see Chattanooga, Battle of*). The vast hydroelectric power available here, with adjacent forests, and deposits of coal, iron, and other minerals, is making Chattanooga one of the great cities of the new South.

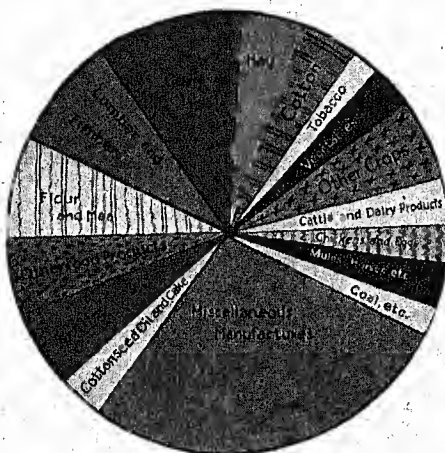
The Cumberland Plateau, abruptly rising 900 to 2,000 feet above the valley, is rich in mineral springs, water power, coal, iron, and other minerals. Its southern end is deeply cut for 60 miles by the Sequatchie Valley, 60 miles long and 3 to 5 miles wide.

The "Garden Valley" of Middle Tennessee

Middle Tennessee, dropping abruptly from the irregular jagged edge of the Plateau, is for the most part a level plain furrowed by many ravines and streams, sloping to the Central Basin, an elliptical depression of about 5,000 square miles, extending nearly across the state from northeast to southwest. This is the "garden of Tennessee," containing the finest farming lands. In its northwestern part, on the Cumberland River, is Nashville, the capital and second largest city (*see Nashville*).

Beyond the valley of the Lower Tennessee, the western part of the state slopes gently down to the Mississippi River, the plain terminating sharply in a line of bluffs overlooking the alluvial bottom lands—low, flat, marshy, and studded with lakes. Memphis, the largest city, is built on a bluff overlooking the Mississippi in the southwest (*see Memphis*).

Tennessee has about 1,200 miles of navigable streams, which have been important factors in the development of the state, long providing the chief means of transportation. The Mississippi, the Tennessee, and the Cumberland rivers (the two latter tributaries to the Ohio) form the chief drainage basins. The Tennessee, formed by the junction of the Holston and French Broad rivers, near Knoxville, crosses the state twice in the 950 miles of its course. Flowing southwestward to Chattanooga, it swings around in a broad curve through northern Alabama, reenters Tennessee and flows north to the Ohio, which it joins at Paducah, Ky. The river derives its name from the Indian words for "big bend," and the state is often called the "Big Bend State" after the river and its great loop. A series of dams on the Tennessee and its tributaries, under construction by



Relative Value of Tennessee's Products

the Tennessee Valley Authority, is designed to maintain a nine-foot navigation channel from Knoxville to Paducah (*see Tennessee Valley Authority*).

The Cumberland River, rising in the Cumberland Mountains in southeastern Kentucky, follows a U-shaped course in the northern part of the state and flows back into Kentucky, entering the Ohio River not far from the Tennessee, 715 miles from its source. Along this river is some of the most beautiful scenery in America. On its way down from the highlands it forms Cumberland Falls, with a vertical drop of about 66 feet; and a few miles farther on it rushes through a gorge whose walls rise 300 feet or more. A series of government locks and dams make the river navigable the entire year from Nashville to its mouth, a distance of 193 miles. Several large water-power plants are now in operation, and much more power awaits development on the many streams and rivers of the state.

Tennessee is first of all an agricultural state, only 35 per cent of its population being urban. About four-

A BIRD'S-EYE VIEW OF THE VOLUNTEER STATE



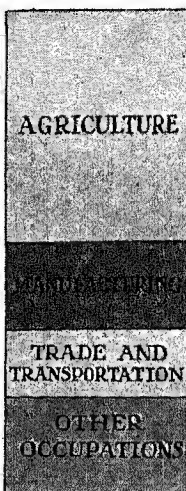
The three main divisions of Tennessee may easily be traced on this relief map—Western Tennessee, from the Mississippi to the Tennessee River; Middle Tennessee, to the sharply rising Cumberland Plateau; and mountainous Eastern Tennessee.

fifths of its area is suitable for farming and about one-half of this is improved. Almost every crop listed in the federal census is grown, but corn, cotton, hay, tobacco, and wheat are the great staple crops. Large quantities of clover, timothy, soy beans, cowpeas, vetch, and alfalfa are grown for hay. All the fruits and vegetables of the temperate zone thrive in almost every part of the state, and Tennessee strawberries and tomatoes arrive in northern markets before the snow has disappeared. Commercial orcharding and gardening have been developed, and the raising of cattle, sheep, hogs, and poultry is increasing.

Tennessee's Rich Mineral Resources

Bituminous coal, mined extensively on the Cumberland Plateau, is the most valuable of the state's rich mineral resources. In the Ducktown Basin in southeastern Tennessee more copper is mined than in any other state east of the Mississippi except Michigan. In connection with copper mining, sulphuric acid is produced. Zinc, in the east, and iron, in the east and central parts, are also important. Gold and silver have been mined, but not in large quantities. In Henry and Carroll counties in the west an excellent quality of ball clay is found, and in practically every part of the state there are rich deposits of clay and shale suitable for building brick. The quarries of eastern Tennessee yield fine building marble, in the production of which the state leads the country. Most of the quarries are near Knoxville, which is the center of the marble industry. The limestone and shale deposits in the middle and eastern part of the state are the basis of Tennessee's growing cement industry. Phosphate rock is mined extensively around Mount Pleasant and Centerville; Tennessee's output ranks second only to Florida's.

Forests of oak, chestnut, hickory, walnut, ash, elm, maple, red cedar, and a wide variety of other trees cover nearly half of Tennessee. Lumber and



This shows the relative number of persons in various occupations.

timber products are leading manufactures. Memphis is one of the greatest hardwood centers in the country. Flour, iron and steel, cotton goods, knit goods, cottonseed-oil, cake, and meal, rayon, tobacco, and chemicals are likewise of increasing importance in the industrial life of Tennessee.

The Schools of Tennessee

The University of Tennessee at Knoxville is the head of the state system of education. There are state teachers colleges at Johnson City, Murfreesboro, and Memphis. Tennessee Polytechnic Institute is at Cookeville. The George Peabody College for Teachers, Vanderbilt University, the Ward-Belmont School, Fisk University (for negroes), and the Tennessee Agricultural and Industrial State Teachers College (for negroes) are at Nashville. The University of Chattanooga is at Chattanooga; the University of the South, at Sewanee; and Cumberland University at Lebanon.

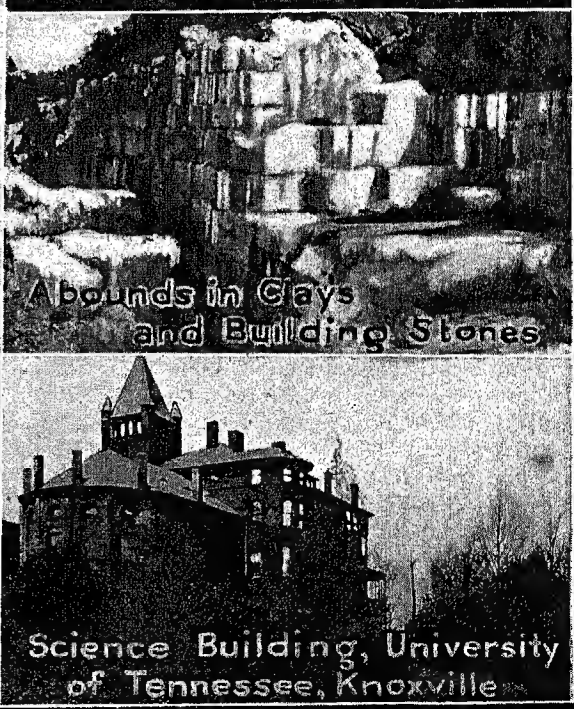
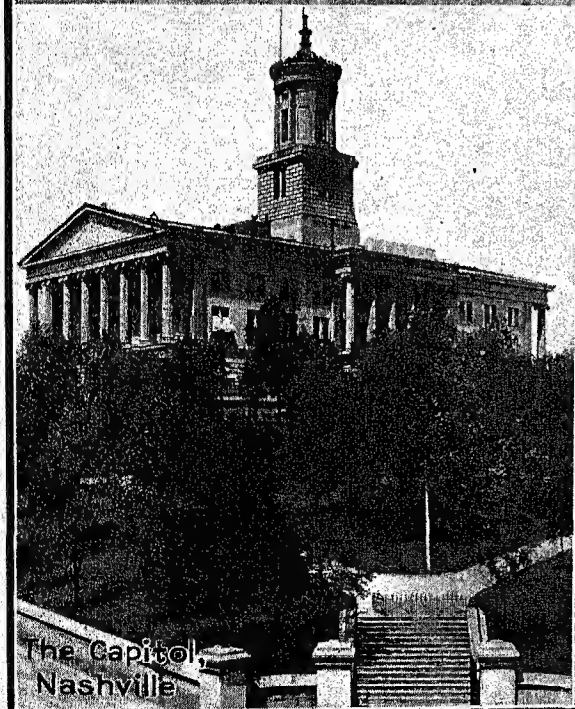
Tennessee's constitution, adopted in 1870, provides so complicated a procedure for amendment that every effort to change it has failed. Only once in six years may an amendment be proposed by a majority vote of the general assembly. Then it must be approved by two-thirds of the members elected to the next general assembly, and afterwards agreed to by the majority of the people of the state.

The general assembly consists of a senate of 33 members, and a house of representatives of 99. Members of both houses are elected for two years. No clergymen are eligible for either house. With the exception of the governor, who is elected, executive officers are appointed: the secretary of state and treasurer, by the general assembly; and the attorney general, by the judges of the supreme court.

The State's Early History

The first white explorers in Tennessee found the valleys and mountains of the east inhabited by the Cherokee, and southern Tennessee by the Chicka-

FROM THE MISSISSIPPI TO THE APPALACHIANS



With its fertile river bottoms, its rich store of minerals in the highlands, its forests, and its abundance of water power, Tennessee is one of the most favored of the states as to variety of resources. Corn is the chief crop, followed by cotton and hay. Coal is the most abundant mineral. The University of Tennessee was founded in 1794 as Blount College.

mauga and Creek, while all the land along the Mississippi was claimed by the Chickasaw. When De Soto marched from Florida to the Mississippi in 1541, he probably crossed the southwestern tip of Tennessee. If so, he was possibly the first white man to enter the limits of the present state. (See De Soto.) Nearly a century and a half later, La Salle, the chivalrous pathfinder of New France, had traversed the great Mississippi from its junction with the Illinois to its mouth and claimed this large territory, which he named Louisiana, for Louis XIV of France. In accordance with his plan to colonize this new realm, he built

Fort Prud'homme in 1682 on part of the ground where the city of Memphis now stands. (See La Salle.)

French dominion in Tennessee was soon challenged by the English on the Atlantic coast. In 1690 Cornelius Doherty of Virginia visited the Cherokee, and James Adair lived among them from 1735 to 1775. In 1748 Thomas Walker, a physician from Virginia, led a party across Cumberland Gap to hunt along the Cumberland River. The daring Daniel Boone and other hunters and trappers from near-by English colonies soon moved into this region (see Boone, Daniel). The English built Fort Loudon on the Little Tennessee River, about 30 miles from the present city of Knoxville, in 1756, but four years later the Cherokee destroyed it. After the close of the French and Indian War in 1763, England gained complete control of this land. The first permanent settlement in Tennessee was started by William Bean, a Virginian, who erected a log cabin on the Watauga River in 1769. Other settlers from Virginia, South Carolina, and Regulators from North Carolina (see North Carolina) poured over the mountains into the rich Holston valley and along the Nolichucky River. Finding themselves in Indian territory, set aside by the British government, and without title to their lands, the Watauga settlers decided to form an association to lease their lands from the Indians. Inspired by two men, John Sevier, an educated frontiersman, and James Robertson, they met in assembly in 1772 and formed the Watauga Association, which adopted one of the early plans of self-government west of the Alleghenies. It provided for a committee of 13 commissioners chosen by the people, and vested the

executive and judicial powers in five magistrates selected from this number, with a clerk and a sheriff. The inhabitants adopted the laws of Virginia for their government and leased their lands from the

Indians who held them as common hunting territory.

At the beginning of the American Revolution, the Watauga people asked to be annexed to North Carolina as the Washington District, so that they would not be left alone to face the invading British and the hostile Indians who were attacking them from all sides. Led by Isaac Shelby and John Sevier, these courageous pioneers defeated the

British under Col. Patrick Ferguson at King's Mountain on Oct. 7, 1780.

After the war, North Carolina offered the whole Tennessee region to the Federal government. Angered by this, and menaced by Indians and Spaniards, the settlers organized a new state, "Frankland," later "Franklin," which Congress and North Carolina ignored. A second offer of the territory by North Carolina in 1790 was accepted by the Federal government. After six years as a territory, Tennessee entered the Union in 1796 as the 16th state, with Sevier as first governor. (See Sevier, John.)

In the Mexican War Tennessee was nicknamed the "Volunteer State" when 30,000 men responded to the governor's call for 2,800 troops. Before the Civil War Tennessee opposed secession; but after its outbreak the people voted overwhelmingly to join the Confederacy. Under the lead of Andrew Johnson, the eastern and some of the central counties organized a Union government. This region has since remained Republican in an otherwise Democratic state.

A Great Battlefield of the Civil War

Tennessee witnessed more battles in the Civil War than any state except Virginia. More than 400 engagements were fought on its soil. The state gave 115,000 soldiers to the Confederate army, and eastern Tennessee sent 31,000 to the Union armies.

Tennessee was the first of the Southern states to be readmitted to the Union (July 24, 1866). While the state had the good fortune to escape the rule of the "carpetbaggers," the vote was confined to those whites who had been loyal to the Union, and to the negroes. The Ku Klux Klan was organized at Pulaski,

A GREAT EDUCATIONAL CENTER



The Social-Religious building of George Peabody College for Teachers follows the classical style of southern colonial architecture that marks all halls on its wide campus, adjoining Vanderbilt University, at Nashville. Organized in 1875, as Peabody Normal College, with part of the fund donated by George Peabody for the promotion of education in the war-torn South, it has played a long and useful part in training the Southern teacher for her difficult task.

Tenn., in 1865, to maintain supremacy of the white race. Stagnation followed the Civil War, but since 1880 Tennessee has made steady progress, especially in mining and manufacturing.

TENNESSEE VALLEY AUTHORITY. The Tennessee Valley is a region of rich bottom lands, hills, and mountains drained by the winding Tennessee River. This flows along placidly in dry seasons, but in times of heavy rainfall it floods the surrounding lowlands and washes away the fertile soil. In this area of some 42,000 square miles are parts of seven states—Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia—and a population of about 2,000,000 people, nearly half of whom are engaged in farming.

The region is rich in natural resources—potential water power, coal, phosphates, other minerals, and varied plant life—but its farmers have not prospered. Disastrous floods and poor farming methods have combined to impoverish the land. The hillsides and uplands have been cleared of their protecting forests, and fields have been planted year after year with corn and tobacco and cotton. These crops not only exhaust the soil, but they also fail to hold it in place as will forests or forage crops; hence the fields have become gullied and eroded by torrential rains that washed out the soil and swept it down into the river. As a result, most of the farmers of the valley have found it hard to make a bare living. They have lived in overcrowded, insanitary houses or cabins, and they have lacked proper clothing and food.

In 1933 the United States government chose this "cross-section of America" for an elaborate experiment in social and economic planning, in the hope of making a new life for its inhabitants. The basis of the plan was the harnessing of the Tennessee River for power production, flood control, and the improvement of navigation. Thus the great river was to be made to work for the people of the valley instead of against them. For the first time, the possibilities of a whole river system were to be coordinated and treated as a unit. Another main objective was to obtain for the United States treasury some return on the capital which the government had invested in the Wilson Dam and power and nitrate plants at Muscle Shoals, Ala.

A corporation, the Tennessee Valley Authority (TVA), was set up to undertake the work. Wide powers were given it, including the building of dams, power houses, and transmission lines; the manufacture of fertilizers at Muscle Shoals for national consumption; and the sale of hydroelectric power. From its distribution of power, the Authority was expected to work out a national "yardstick" for costs and fair rates in the public utility field.

Other objectives sought in the TVA plan were the prevention of soil erosion; reforestation; the balancing of agriculture and industry by the promotion of small-scale manufactures to use the cheap power and raw materials of the region; improved agriculture with

dairying and diversified crops; education of the farmers in crop rotation and other sound farming practices; conservation of the basin's natural resources; the introduction of domestic industries to provide the farmers with free-time work and added income; and a general educational program including vocational training and education for health.

The heart of the program was the construction of a series of dams on the Tennessee River, between Knoxville and Paducah, and on various of its tributaries. Norris Dam, on the Clinch River, forms one of the country's greatest storage reservoirs.

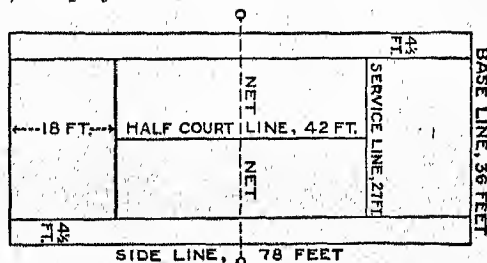
Following Supreme Court decisions that upheld the right of TVA to sell electric power, the completed dams supplied electricity in the Tennessee Valley. After heated controversy, the major private power companies in the valley were bought out by TVA, which was able to sell electricity at more than 50 per cent below the average cost for the rest of the country.

Since much of the nation's aluminum and other important defense materials is produced in the Tennessee Valley, the TVA's power program was substantially increased when war became imminent in 1941. Additional dams and power plants were hastily built, and existing private installations were put under TVA control.

TENNIS. Lawn tennis is a modern development of an older game of tennis played in a covered court. The present game was first played in England about 1873, and soon after was introduced in the United States.

It is played on a level court of grass, asphalt, concrete, or earth. Clay courts are often surfaced with brickdust, stone dust, or special preparations. Markings and dimensions are shown in the diagram below. The $4\frac{1}{2}$ -foot side courts are used only for the "doubles" game. The net is 3 feet high at the center and $3\frac{1}{2}$ feet at the posts. The ball is between $2\frac{1}{2}$ and $2\frac{5}{8}$ inches in diameter and weighs between 2 and $2\frac{1}{8}$ ounces. Rackets are usually wooden frames strung with gut, weighing from 13 to 16 ounces.

At the start of a "singles" match between two persons, one player "serves" while the other "receives."



This shows the standard plan and dimensions of a tennis court for both "singles" and "doubles" play.

The server stands behind the baseline, and strikes the ball over the net into the service court diagonally opposite. If the first ball is a "fault," he may serve another. The receiver, or "striker-out," as he is called, must hit the ball on the first bound, trying to drive it back over the net so that it will fall

within the court. If he fails to return it over the net or sends it outside the court, he loses the point. After the service has been returned either player may hit the ball before it has bounced—"volley" it—if he wishes. The ball often passes back and forth across the net several times before one of the players fails to return it. The service alternates, first from the right, then from the left court, and a player continues to serve until he wins or loses a game, when the service passes to his opponent. The doubles game on the larger court—with two players on each side of the net—is played in the same manner, except that the partners alternate in serving.

Other Technical Terms of Tennis

The first point won makes the score 15, the second point 30, the third 40, and the fourth wins the game unless each player has scored 40. In that case the score is "deuce," and in order to win the game thereafter one player or the other must take two points in succession. The scores "15 to 0" and "30 to 0" are called as "15 love," "30 love," etc., the opposite are "love 15," and so on. The first of the two points after "deuce" is called "advantage in" if won by the server, and "advantage out" if won by the striker-out.

At the end of each game the player who has served becomes striker-out while his opponent serves. The play continues until one player wins six games, which gives him the "set." If, however, the score should become five games all, the set stands at "deuce" and one player or the other must win two consecutive games in order to win the set. Sides are changed at the end of every set. A match is either two out of three sets or three out of five.

The principal strokes that a player uses in returning the ball are the "forehand drive," the "backhand," the "volley," the "lob," and the "overhead smash." If he is a right-handed player and the ball falls to the right of his body and in front of him, he uses his forehand drive by hitting the ball with a vigorous forward swing near the top of its bounce. If the ball falls to his left, he swings the racket across his body and hits it with a back-hand stroke. Often when he can reach the ball before it bounces he "volleys" by hitting it while it is still in the air. If his opponent has run in close to the net he sometimes "lobs" by sending the ball over the opponent's head. The overhead smash is used in "killing off" any weak returns that his opponent may send high above the net.

The Art of Serving

Service gives opportunity for many skilful strokes. Within recent years a most effective service has been developed in the United States, known as the "American twist" service. By tossing the ball directly overhead and by hitting it in such a way as to give it a spinning motion, it is sent across the net on a right to left curve, "breaking back" on the bound from left to right on striking the ground. It is extremely difficult for the striker-out to hit this service squarely.

There are many "fine points" in lawn tennis and much opportunity for the study of technique. Quick-

ness of mind, eye, and limb are essential—and endurance too, for a fast match between skilful opponents calls for the strenuous exercise of virtually every muscle in the body.

Court tennis, the father of lawn tennis, is one of the oldest of ball games and one of the most difficult to learn. It is played in a walled and roofed court. Around the two end walls and one side wall runs a corridor with a downward-sloping roof, called the "penthouse." The net across the middle divides the court into the "service" side and the "hazard" side. In the end wall on the service side under the penthouse is an opening for spectators, called the "dedans," protected by a net. The wall to the right of the service side is clear except for a buttress called the "tambour." The racquets used are strong and heavy with a bulging side, and the interior of the ball is of cloth. The play is too complicated to be explained in detail. In general, the ball, struck from the service court, must go over the net, hit the side penthouse roof or the wall above it, and must rebound into the service court of the hazard side; otherwise it is a pass or a foul. The score is counted as in lawn tennis.

TENNYSON, ALFRED (1809–1892). No other English poet, during his own lifetime, has held England under such unbroken sway as this master minstrel of the Victorian Age. Born in the rectory of Somersby, Lincolnshire, son of the Rev. Charles Tennyson, he began to write verse in childhood. At 18 he and his brother Charles published a small book of poetry, and at 20, while at Trinity College (Cambridge) he took the Chancellor's prize with 'Timbuctoo' written in unrhymed verse. A volume of poems issued at the age of 24, contained such exquisite things as 'The Lotus Eater', 'The Lady of Shalott', and 'The Dream of Fair Women'. Tennyson's work thus early displayed happy phrasing, finished art, and sentiment fresh, pure, and deep. Soon after, when he lost his closest friend, Arthur Hallam, by death, he turned in sorrow to the theme of life and death. But the depth of his grief and his spiritual consolation were not revealed until 17 years later with the publication of 'In Memoriam'. "This noble elegy, the most illustrious single poem of the 19th century," says Henry van Dyke, "is the English classic on the love of immortality and the immortality of love."

When 'In Memoriam' appeared in 1850, Tennyson had already won his place as the first poet of England. Meanwhile the sale of his poems had gradually increased to such a point that it was safe for him to settle down, and on June 13, 1850, he was married to Emily Sellwood, the young woman who had waited for him through ten years of poverty. Of this happy marriage it is enough to record Tennyson's own words, written many years later: "The peace of God came into my life before the altar when I wedded her."

It now appeared as if every kind of good fortune were about to descend on the man who had struggled for years against every kind of bad luck. Less than six months after his marriage he was appointed poet

THE CHIEF STROKES IN TENNIS

THE SERVICE. Of all tennis strokes the service is most important and requires the most persistent practice. If you have a strong and accurate service, you at once put your opponent on the defensive. If your service is ineffective, your opponent starts with the advantage. One of the most effective services, the "slice," is illustrated in the pictures at the top of this page. The player stands just behind the baseline with the feet at an angle of about 45 degrees to the line. As the ball is tossed up, slightly to the right of the head, the racket comes up and back, down behind the right shoulder, then forward, meeting

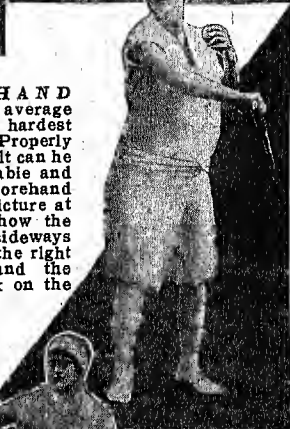
the ball as high as possible. The racket face is outside the ball, and slightly over it. As the racket swings down it travels from right to left, giving a spin to the ball. Note the position of the feet at an angle to the baseline. The weight is on the right foot, ready to be shifted to the left foot just before striking the ball, as shown in the picture at the right.



THE FOREHAND DRIVE. This stroke is made with the feet sideways to the net. The swing should begin well behind the body.



THE BACKHAND DRIVE. For the average player, this is the hardest of tennis shots. Properly played, however, it can be made as dependable and effective as a forehand stroke. In the picture at the right, note how the feet are placed sideways to the net, with the right foot in front and the weight well back on the left foot.



FINISH OF DRIVE. The racket should meet the ball about waist-high, well away from the body. At the moment of impact it turns up and over the ball, to give the ball top spin. Let the racket follow through to the natural limit of your swing, as shown in this picture. This is important, because the follow-through gives direction and length.



THE SMASH. This spectacular shot is used near the net when your opponent tries to lob over your head. The swing is similar to that used in serving, but the racket face is held flat.



FINISH OF THE DRIVE. As the racket swings into the ball, the weight is shifted to the right foot, with rather more rotation of the shoulders than in forehand play. Notice the grip. For the backhand stroke the racket is usually shifted about a quarter-circle in the hand, so that the knuckles point directly upward, with the thumb extended along the handle. The wrist is kept stiff.

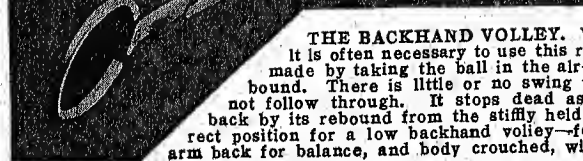
THE BACKHAND GRIP. The racket is turned so as to strike with the opposite face to that used in the forehand stroke.



THE FOREHAND GRIP. The racket should be held so that it forms a straight line with the arm, with no angle at the wrist.



THE BACKHAND VOLLEY. When playing close to the net it is often necessary to use this rather difficult shot. A volley is made by taking the ball in the air—"on the fly"—without letting it bound. There is little or no swing to this stroke, and the racket does not follow through. It stops dead as it meets the ball, which is driven back by its rebound from the stiffly held racket. These pictures show the correct position for a low backhand volley—feet sideways to the net, wrist stiff, left arm back for balance, and body crouched, with the weight coming on to the right foot.



laureate, succeeding Wordsworth. In 1854 he wrote his popular poem, 'The Charge of the Light Brigade', and in 1859 appeared the first volume of the 'Idylls of the King', which won a popular success greater than was ever achieved by any other English poet with the possible exception of Scott and Byron. Then followed more than 30 years of increasing fame and wealth, culminating in the honor of being raised to the British peerage in 1884 as Baron Tennyson.

It is difficult to characterize the style and estimate the value of a poet who wrote so much and on such different themes over a period of 60 years, but certain qualities may be noted. All of his work was marked by melody, as of music heard in the blue mystery of twilight, the tender haze of dawn, or the glory of sunset; for no less marked was the intimate feeling for the beauties of land and sea which invests his verse with an atmosphere of delicate enchantment. All of rural England is in such lines as

—gray twilight pour'd
On dewy pastures, dewy trees,
Softer than sleep—all things in order stored,
A haunt of ancient peace.

He had an imaginative sympathy with human nature; a reverence for order and tradition; and he was so profoundly spiritual that he has been called "the poet of the endless life." In poetic romances of the highest ethical worth he clothed King Arthur and his knights with new dignity and splendor. The public was enchanted with the purity, sweetness, noble sentiments, and pageantry of the 'Idylls of the King', and as they appeared a few at a time, over a period of many years, they were waited for and received with an acclaim unparalleled in English poetry.

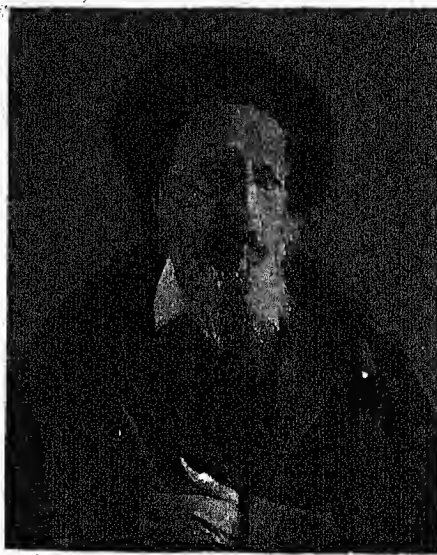
These 12 narrative poems are unified through the personality of the hero, Arthur, the ideal king. (See Arthur, King.) Beginning with 'The Coming of Arthur', the poet traces the establishment of the Order of the Round Table and the building up of the kingdom, various events in the lives of Arthur and his knights, including the great quest for the Holy Grail, and the gradual decay of the kingdom through the sin and treachery of those whom the king had trusted. Finally, in 'The Passing of Arthur' he pictures that "last, dim, weird battle" in which Arthur receives a mortal wound and is borne away to "the island-valley of Avilion." Underlying the story a deeper allegorical meaning is suggested, that of "sense at war with soul," the struggle of the human soul as it passes through the long fierce struggle of life to death and immortality.

Tennyson sounded the trumpet-note of English heroism; and he stole his way into the hearts of English-speaking peoples everywhere with his matchless lyrics and narrative poems and little bursts of song that almost set themselves to music. Last of the great group of Wordsworth, Coleridge, Byron, Shelley, and Keats, Tennyson was more remarkable for beauty and lofty and tender sentiment than for the vigor and strength that marked much of the English poetry after Browning. His chief disappointment as a writer was the failure of his persistent attempts to write drama that could be acted.

Tennyson's influence on the thought, feeling, and taste of his time was both wide and profound. In later years, while living on beautiful country estates on the Isle of Wight and in Sussex, he was a figure of interest and reverent admiration. His life came to a serene, poetic end at the age of 83. Through the immense uncurtained window which framed his view of the English Channel, he looked his last on the moonlight and the sea, and had his wish for—

Sunset and evening star
And one clear call for me,
And may there be no moaning of the bar
When I put out to sea.

Tennyson's chief works are: 'Timbuctoo' (1829); 'Poems, Chiefly Lyrical' (1830); 'Poems', which include the 'Morte d'Arthur' of the 'Idylls of the King' (1842); 'The Princess, a Medley' (1847); 'In Memoriam' (1850); 'Maud' (1855); 'Four Idylls of the King' (1859); 'Enoch Arden and Other Poems' (1864); various poetic dramas from 1875 to 1884, of which 'Becket' was successful as a stage play; 'Ballads' (1880); 'Idylls of the King' at long intervals until the cycle of 12 was completed; 'Locksley Hall Sixty Years After' (1886). In the year of his death Tennyson completed the drama of 'The Foresters' (the story of Robin Hood and Maid Marian).



TENNYSON
Most Melodious of Victorian Poets

TEREDO. Though called a shipworm by many, the teredo is actually a mollusk, like the oyster. Wormlike in form, grayish white, with a wispy forked tail and a head resembling a clam, the common species (*Teredo navalis*) attains a length of one to two feet. Some tropical species grow to six feet. They begin as free-swimming larvae, are carried by

currents against wharves and the hulls of wooden ships, and begin boring in immediately. In a few hours only the siphoning tail is left in contact with the water. Wood is their food, which they pulverize with their tiny rows of teeth, and they are capable of devouring the toughest oak. A four-year teredo invasion of San Francisco Bay damaged wharves and docks to the extent of 25 million dollars. Yet teredos are so fragile that they can scarcely be handled. To combat them, wood is treated with creosote.

TERMITES and Their Amazing SOCIAL ORGANIZATION

TERMITES. Sometimes termites are called "white ants," but they are not ants. They are more nearly related to cockroaches, although their social organization is antlike. They can readily be distinguished from ants by the lack of a "waist" where thorax joins abdomen.

Of the 56 species in the United States the most important are the "ground-nesting" termites. A typical colony lives underground in a damp, chamber-like nest. The colony is made up of four different adult forms or castes. These are the royalty, the nobility, and two proletarian groups—the soldiers and the workers. The royalty consists of the ruling king and queen, who carry on the work of reproduction, and the winged young kings and queens, who will leave the nest to start new colonies. The nobility consists of wingless adults, who take over the work of reproduction if the king or queen dies. The soldiers and the workers—gray-white, wingless, entirely blind, and only about one-fourth of an inch long—comprise most of the colony. They include both male and female forms but they are sterile. The soldiers guard the nest against insect enemies, chiefly ants. The workers keep the colony supplied with food.

A Cellulose-Eating Partnership

It is the food-getting activity of the termite workers which makes them so destructive, for their main food is wood fiber or cellulose, which they get from dead trees, from rotting plant material in the soil, or from fence posts, telephone poles, house timbers or furniture.

Cellulose is indigestible to nearly all animals, large or small, and termites are no exception to this rule. But the termite workers have formed a remarkable partnership with tiny creatures (protozoans), which they harbor in their intestines. The workers chew and swallow the woody fiber, and the protozoans digest it for them. The soldiers also have protozoan partners and can digest wood fiber after the workers have chewed it up. Their enormous fighting jaws prevent them from gathering this fiber for themselves. The royalty and nobility lack the protozoans and must be fed on digested cellulose secreted by the workers.

Tunneling from the nest, the workers ordinarily attack a house by entering the timbers in contact with the ground. If a house has a stone foundation, the

termites may build earthlike shelter tubes over the foundation and up to the beams. Under a porch they may erect towers a foot or more high to reach the wooden floor. Once inside the woodwork of a building, they tunnel in all directions, without ever making an opening that shows on the surface, for termites shun the open air. The first sign of their presence may be the collapse of a wall or of pieces of furniture that they have entered at the point where the legs touch the floor. They work in large numbers. As many as 4,000 have been counted in a cubic foot of wood.

Once a year the young kings and queens leave the parent nest in pairs and each pair starts a new colony near by. They then shed their wings. Within a short time the young queens may be laying eggs at the rate of three to five thousand a day. To rid a locality of termites would require the destruction of every one of the nests. More practical are the measures adopted to "insulate" buildings against them by treating their woodwork with poisonous chemicals or by sheathing possible points of attack with metal.

Less destructive than the "ground-nesting" termites are the "dry-wood" termites in the United States. They do not live in the soil, but fly to and attack wood directly. Their colonies are small.

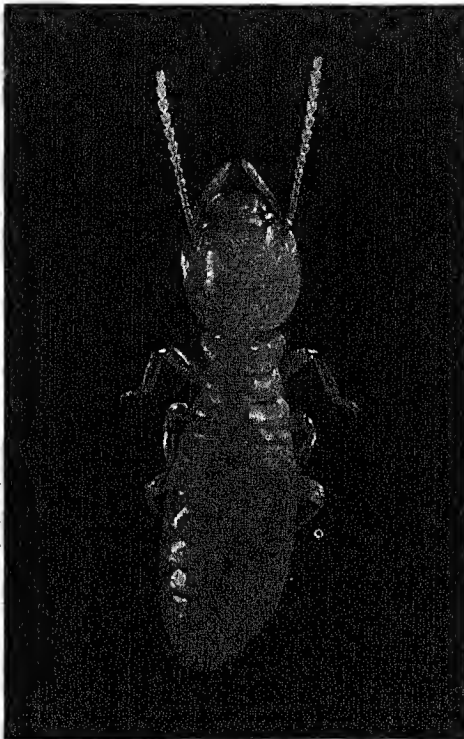
Mound Builders

In South America, Africa, and Australia live the mound-building termites. Their brown mounds or *termitaries* often crowd together in a close

group with slender towers rising like a city of skyscrapers. Hard as concrete, they are built up with saliva-soaked particles of soil. In the group may be some that were started by the termites hundreds of years ago and are now 20 feet high and 40 feet wide at the base. The base is usually roughly oval, with the long axis pointing north and south, so the sun can reach both of the broad side walls and keep them dry.

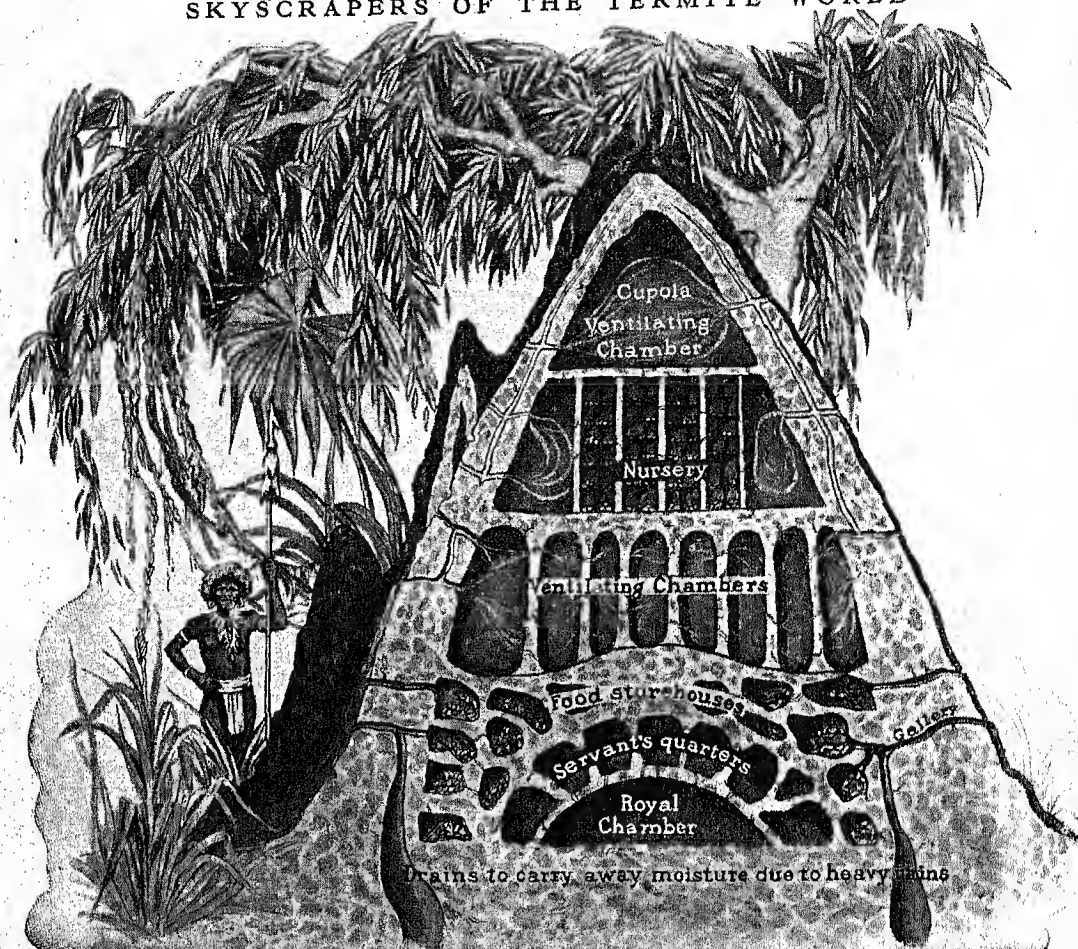
Inside the walls of each *termitary* the same complex social order prevails as among the ground-nesting termites. The king and the queen occupy the royal chamber. The king is small, but the queen, distended by as many as 75,000 eggs, may become four inches long. Some of the larger specimens lay one egg each second, twenty-four hours a day, for their span of usefulness,

A DESTROYER OF WOOD



This is an American termite of the worker caste, magnified ten times. Sightless and wingless, it shuns daylight and is seldom seen by householders. But the damage to buildings and furniture done each year by these insects runs into millions.

SKYSCRAPERS OF THE TERMITE WORLD



In South America, Africa, and Australia, certain species of termites build mounds that tower as high as 20 feet. The outer walls are molded of earth particles held together by moisture and baked hard as concrete by the sun. Inside the walls, the termites fashion chambers and passageways, each having its special use. Note the provisions for ventilation and drainage. These mound colonies are even more highly organized than the underground colonies of termites described in the text. For clearness, the divisions in this cross-sectional drawing are made more precise than they are in real life.

which is three to ten years. She is pampered and stuffed with food by devoted attendants. The eggs are taken by nurses, washed with saliva to prevent mold, then carried to the hatchery and placed in well-ordered piles. The hatchery is kept exceptionally warm by small heaps of fermenting vegetation.

Young members of royal caste loiter about, waiting to go forth to establish colonies of their own. The sightless soldiers, with their strong scissors-like mandibles, stand guard at every turn of the galleries and tunnels. Other soldiers, equipped with tough helmets to check any onrush of ants, guard the entrances from the outside world. The soldiers of some species have snouts through which they spray on their enemies a sticky liquid that entangles their legs and also stupefies them. The worker caste gathers bits of wood to feed the entire community. Some colonies grow mushrooms in fungus gardens. Some have community "cows"—small beetles (*termitophiles*) found only in termite nests that secrete a fluid relished by the colony.

Termites belong to the order *Isoptera*. The scientific name of the common subterranean or "ground-nesting" termite is *Reticulitermes flavipes*; of the Florida "dry-wood" termite, *Cryptotermes brevis*; of the chief African mound builders, *Termites bellicosus*.

TEUTONS. Those peoples who speak any one of the various Teutonic languages—English, German, Dutch, Flemish, and the various Scandinavian tongues—are properly grouped together as "Teutons," though the name is at times more narrowly applied to the people of Germany, as the more numerous stock. The name "Teutonic invasions" is often applied to the wandering of Germanic peoples, from the 4th to the 9th centuries inclusive, which overturned the Roman Empire in the west and established the nations of western Europe in practically their present locations. The name Teuton was originally the name of an ancient German tribe that dwelt north of the Elbe, and first appeared in the history of Europe along with the Cimbri, about 300 B.C. (See Europe; Goths; Northmen; Roman History.)

The "LONE STAR" STATE Its Storied Past and Its Busy Present



The Alamo was the cradle of Texan liberty. Within its walls perished David Crockett, James Bowie, William B. Travis, and their band of 180 Texans, when Santa Anna and 4,000 Mexicans stormed the little fort. The Alamo is now in the heart of San Antonio.

TEXAS. The "Lone Star" state, as Texas is popularly called, is the only commonwealth that was an independent republic before it joined the Union. During its romantic history it has flown six flags: the French, planted by La Salle over an ill-fated colony on the coast, the Spanish, the Mexican, the "lone star" banner of its independent statehood, the Stars and Stripes, and the flag of the Southern Confederacy.

Texas is by far the largest of the states of the Union in area, and sixth in population. It has a wealth of fertile lands, mineral resources, and industries that are in the midst of an amazing era of development. Tractors, pulling a dozen plows each, turn up long ribbons of sod on land that but a short time ago saw only pioneers, Indians, and Mexicans.

For years Texas has been the richest of the states in farm income. Enormous harvests are garnered from fertile soil in all parts of the state, and even the vast reaches of its western plains have been made to blossom by irrigation. Untold wealth gushes from its oil fields, and its many industries turn out a wide variety of products. At its ports dock ships of every nation.

Longer than from Chicago to New York

A newcomer to Texas is amazed by its size. It covers more territory than France, Belgium, Holland, and Denmark combined. Its irregular southwestern boundary line separating it from Mexico follows the lower course of that colorful "big river," the Rio Grande, for 1,300 miles. Its eastern coast is washed for 400

Extent.—East to west, 825 miles; north to south, 740 miles. Area 267,339 square miles. Population (1940 census), 6,414,824.

Natural Features.—Land surface a series of plains sloping southeast from the plateau of the northwest (*Llano Estacado*, 4,000 feet) and the mountains of the west (highest point, Guadalupe Peak, 8,751 feet). Principal rivers: Red River forming part of the northern boundary; the Sabine on the east; Brazos, Colorado; the Rio Grande forming the southwestern boundary, and its tributary, the Pecos. Mean annual temperature, 66°; mean annual precipitation, 31".

Products.—Corn, cotton, wheat, oats, rice, grain sorghums, fruits, vegetables, peanuts, sugar cane and syrup, pecans, lumber; cattle, hogs, sheep and wool, horses, mules, poultry and eggs, milk, mohair; petroleum, natural gas, cement, stone, gypsum, coal, sulphur, salt, silver, fuller's earth, mercury, helium; petroleum products, flour and bakery products, cottonseed products, railroad cars.

Cities.—Houston (384,514), Dallas (294,734), San Antonio (253,854), Fort Worth (177,662), El Paso (96,810), Austin (capital, 87,930); Galveston, Beaumont, Corpus Christi, Waco, Amarillo (over 50,000).

miles by the Gulf of Mexico. Across the state, from "Texline" on the northwestern corner of the "Panhandle"—as the northern projection of the state is called—to the mouth of the Rio Grande, is a greater distance than that between Chicago and New York. From El Paso, on its western tip, to the Sabine River on the east, the distance is but 100 miles shorter. Its railroads would reach two-thirds of the distance around the earth. They tap each important trade center.

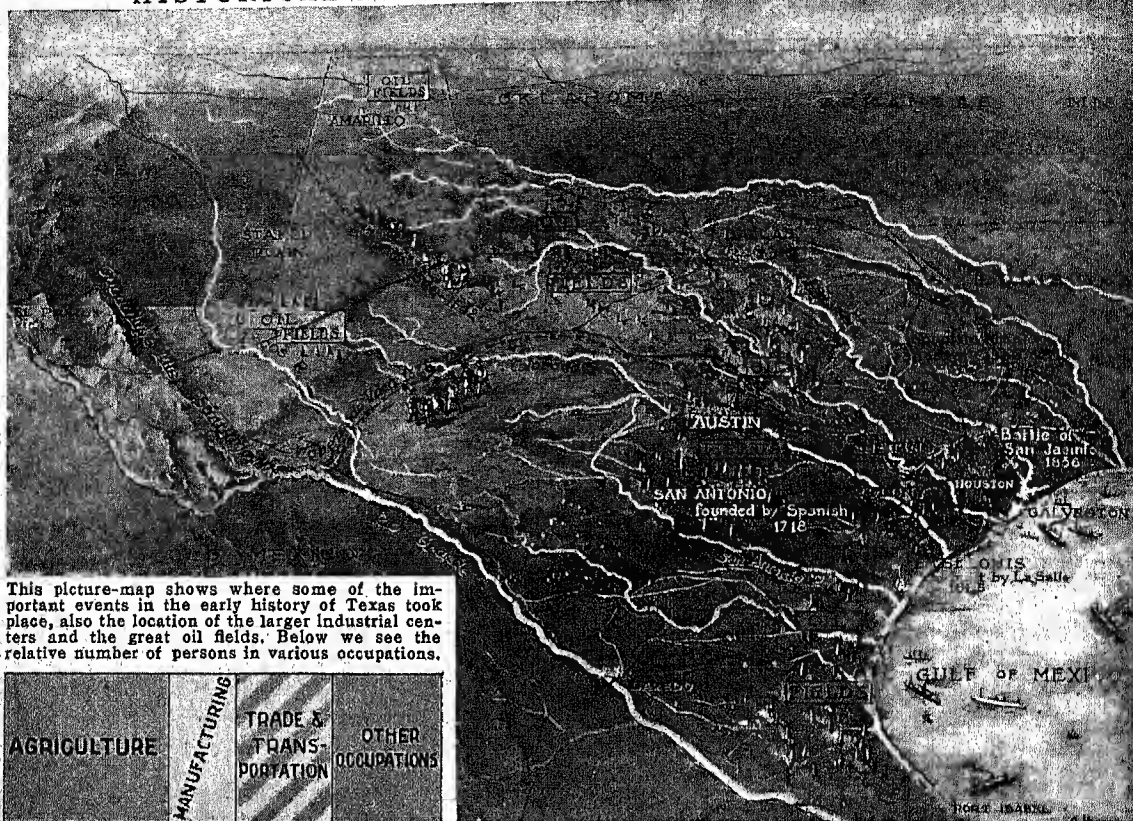
A Texas editor has described the size of the state in these words: "If you tipped the state up and dropped it north like a tossed pancake, it would knock down the skyscrapers in St. Paul; east, and El Paso would drop into the Atlantic; south, and the state would blot out most of Mexico. If all the people in the United States were put into Texas, it would scarcely be two-thirds as crowded as England."

First of All an Agricultural State

Texas is, and probably always will be, principally an agricultural state. Where water supply is certain, either through rainfall or irrigation, the soil of most of the state is very fruitful. The climate is mild, and the growing season extends over many months of the year. The chief crop, cotton, places Texas first among the cotton raising states of the Union. Cotton raising is speeded, especially in the south and the west, by machine cultivation, by "sledders" for picking, and even by airplanes for spreading insect poison. Corn, grain sorghums, and wheat are outstanding crops, as are also oats, hay, and rice. Potatoes, peanuts, tomatoes, onions, spinach, peaches, pecans, citrus fruits, watermelons, and cabbage are raised in great quantities by truck farmers.

Texas is still the country's biggest cow pasture. In recent years the beefy Hereford has routed the lean Texas Longhorn, which originated the western cattle business with its cowboys. Beef first made Texas rich after the Civil War, when "cattle kings" ruled the open range from Texas to Montana, and cowboys drove millions of steers up the trail to northern markets until the middle 80's. The rise of the great fenced ranch and the packing house on Texas soil,

HISTORICAL AND INDUSTRIAL FEATURES OF TEXAS



the cattle tick fight, and the carving of hundreds of ranches into farms have each opened successive chapters in the story of this premier beef cattle state. (See Cattle.) Now dairying is becoming a major industry. No state markets more sheep or wool, angora goats or mohair, mules or turkeys; and Texas is still one of the leaders among all the states in horse breeding.

Oil and Gas

Texas ranks first in production of crude petroleum, for oil wells have been drilled in almost every part of the state. It also produces nearly all of the nation's sulphur, and is among the leaders in output of natural gas, natural gasoline, and carbon black. The Panhandle is the chief gas field, and pipes the fuel as far away as Chicago. Many power plants burn oil, natural gas, or powdered lignite to generate electricity. A broad lignite belt stretching from Laredo to Texarkana, bituminous coal, enormous but little-mined iron deposits, and scattered potash deposits are other Texas riches. Artesian and spring waters well up throughout the state. Cement, clay

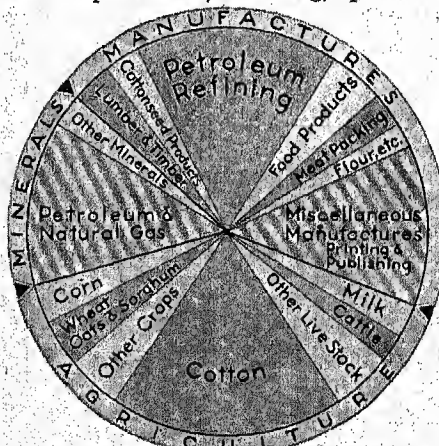
products, sand and gravel; gypsum, stone, asphalt, silver, salt, helium, and quicksilver help to give Texas first place among the states in mineral production.

Among the leading industries of Texas are petroleum refining, production of cottonseed oil and meal, slaughtering and meat packing, lumber manufactures, grain products, and car and railway construction.

The pines—the short leaf, loblolly, and especially the long-leaf—make lumbering an important industry in east Texas, for they form about 90 per cent of an annual lumber cut of nearly one and one-half billion feet. The pole and post cut adds another 400 million feet. Traveling westward through Texas, one passes the highly valued white oak; the swamp-loving cypress; streams banked by pecan, elm, willow, black-jack,

cottonwood, and walnut; cedar-studded hills; live oak groves; mesquite patches; and even Douglas firs.

Considering the great area of the state, it is not surprising that there is as wide a range of climate, plant, and animal life as there is between Florida and Con-

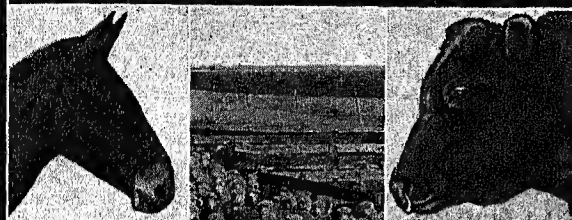


Comparative value of Texas products.

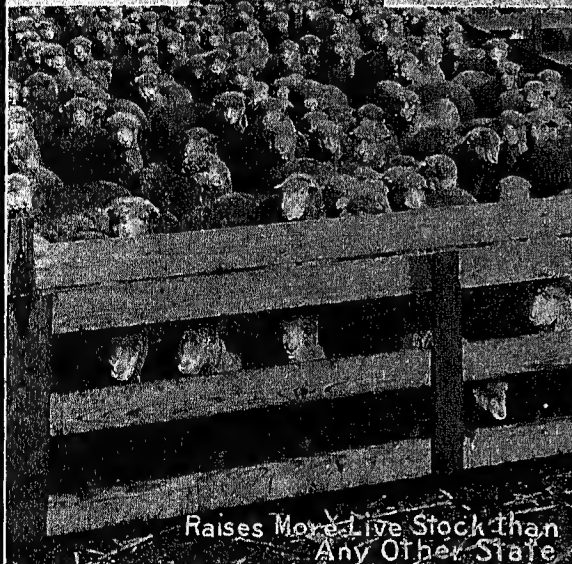
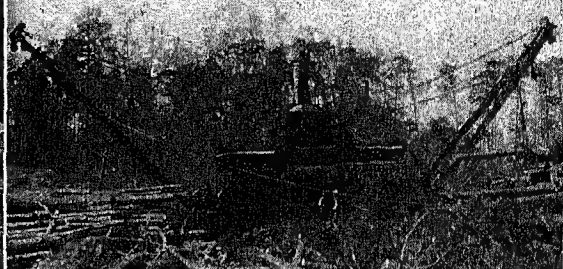
VARIED PRODUCTS OF THE "LONE STAR" STATE



The Nation's Chief Cotton Producer



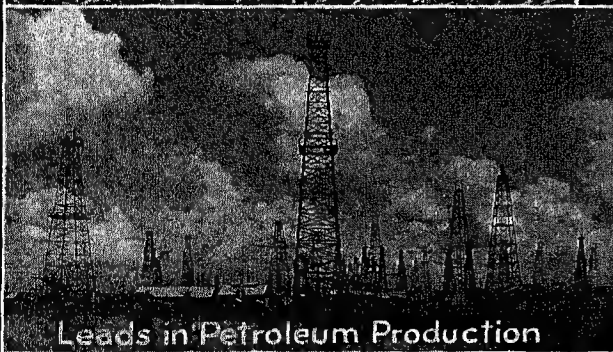
Lumber and Its Products an Important Source of Wealth



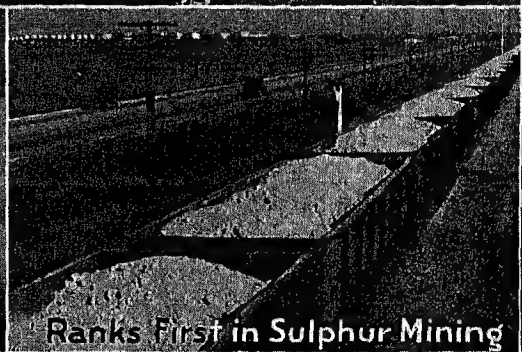
Raises More Live Stock than Any Other State



Extensive Acreage in Fruits and Vegetables



Leads in Petroleum Production



Ranks First in Sulphur Mining

Here are a few of the products that make Texas one of the richest states in the Union. It produces more cotton, live stock, wool, and mohair, more petroleum, natural gas, sulphur, and helium than any other state. The value of its cotton alone exceeds in a year the value of the entire nation's gold and silver,

and its petroleum is worth more than twice its cotton, from 350 to 450 million dollars annually. In recent years Texas has also forged ahead in manufacturing, making finished products of its enormously varied raw materials. One of the newest industries is the manufacture of newsprint from tremendous stands of pine.

necticut. While a blizzard drives across the Panhandle, oranges ripen on the Gulf. Great fields of cotton grow on the rich Black Land prairie, the most thickly populated strip of Texas, reaching from the northeast part of the state to beyond San Antonio.

All Texas rivers follow the slope of the land from the western mountains and high plains south and east to the coast. The extreme northern edge of the state lies in the Mississippi basin. The Red River forms the northern boundary for nearly 400 miles, and the Canadian River crosses the Panhandle to join the Arkansas. Most of the rivers rising in the state flow directly into the Gulf. The chief ones are the Sabine, which forms part of the boundary between Louisiana and Texas, and the Neches, Trinity, Brazos, Colorado, Guadalupe, San Antonio, and Nueces rivers. The Pecos, the greatest tributary of the Rio Grande, rises in New Mexico, and in Texas runs almost parallel with the Guadalupe mountain range to its junction with the Rio Grande.

The Gulf and South Texas

The coastal plains region in south Texas is only a little above sea level. The waters of the Gulf deepen slowly, and along most of the coast lie long islands of white sand, piled up by the breaking waves and enclosing shallow lagoons and bays. Padre Island is the longest of these, extending north 100 miles from the mouth of the Rio Grande; Galveston Island and Matagorda are the next largest. Back of Padre Island, on the shores of the Laguna de Madre, are large salt deposits, and refineries for utilizing them.

By dredging the shallow river channels and Gulf bed, and building jetties, a number of harbors have been opened to ocean steamers. Galveston is a world-famous port for the shipping of cotton (see Galveston).

The rebuilding of this city after it was practically destroyed in 1900 by a hurricane and tidal wave was a brilliant achievement. The thriving harbor of Corpus Christi, 200 miles to the west, suffered a similar disaster in 1919. Although 50 miles inland, Houston,

the largest city in Texas and an early capital of the Texas republic, has become an ocean port through the widening and deepening of the Buffalo Bayou, a sluggish stream, into a ship canal to the Gulf (see Houston). The cities of Brownsville, Port Arthur, Port Neches, Beaumont, and Orange also ship to the Gulf through deep-water channels.

Petroleum, salt, and sulphur are stored beneath the low coast plain. Ditches along the central and eastern rivers irrigate wide rice flats, and truck farmers market figs, berries, melons, and potatoes. Farther to the north and west are cotton plantations and big cattle ranches. Once a jungle of dry prairie growth, the lower Rio Grande valley is now a garden of cotton, citrus fruits and vegetables. Brownsville, at the southern tip of the state, is a winter resort, the metropolis of this market basket and the site of Fort Brown,

which figured in the outbreak of the Mexican War.

Up the river lies Laredo, important trade pathway across the Rio Grande, capital of a truck farming neighborhood, and center of oil, natural gas, and coal operation. Fort McIntosh is near by. In colorful, prosperous San Antonio, third city in the state, new and old Texas live side by side, and army planes maneuver over ancient mission buildings.

Features of East Texas

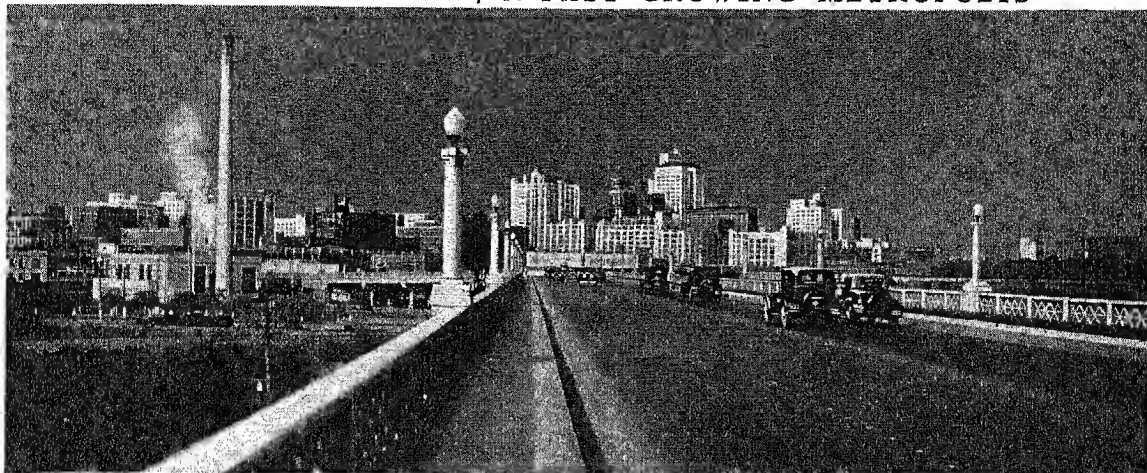
Austin has been the capital since 1839 when it was chosen as the capital of the new Republic of Texas. It was then almost at the frontier and close to tribes of hostile Indians. The first capitol, a large one-story frame building, was surrounded by a stockade for protection against Indian raids as late as 1845, when Texas was admitted to the Union. Texas now possesses one of the finest capitol buildings in the country, paid for in the early days of statehood with three million acres of land in the Panhandle. The University of Texas, among the great educational institutions of the Union, was opened at Austin in 1883.

Northeast of the capital is Waco, a progressive city on the banks of the Brazos, surrounded by rich cotton



This relief map of Texas shows clearly the slope of its vast surface from northwest to southeast, with its parallel rivers running to the sea. The highest sections of the state are in the western part, beyond the Pecos River, and in the Panhandle, which is the rectangular projection at the north.

SKYLINE OF DALLAS, A FAST GROWING-METROPOLIS



One of the world's great cotton markets and an oil headquarters, Dallas has developed this impressive skyline, seen from this approach across the Oak Cliff viaduct. Most of these buildings were erected during the last decade, to provide office space for its rapidly expanding business interests.

and farming country. Still farther north is smartly metropolitan Dallas, the second city in Texas, thanks to cotton, trade, finance, and oil. On the eastern border, half of it in Arkansas, is Texarkana, a railroad headquarters and trade center for hides and lumber.

A patchwork of cotton, wheat, corn, oats, sugar cane, peaches, and truck gardens, dotted by dairy cows and hogs, is flung across the moist lands of east Texas. In the pine and oak forests roam foxes, wolves, and a few bear and deer. Under foot are iron, lignite, salt, gas, and a wealth of oil that started a spectacular "boom" in 1930. The ports of Houston, Galveston, Port Arthur, Beaumont, Orange, Texas City, and Freeport link this important area with the sea.

West and Northwest Texas

The eastern limit of what was once called the Great

American Desert is the lofty Llano Estacado (Staked Plain) in west Texas and eastern New Mexico. As Coronado, the Spanish explorer, pressed on across this great level region, he is said to have driven stakes along his trail to mark his way back, thus originating the name. In the Panhandle section in northwestern

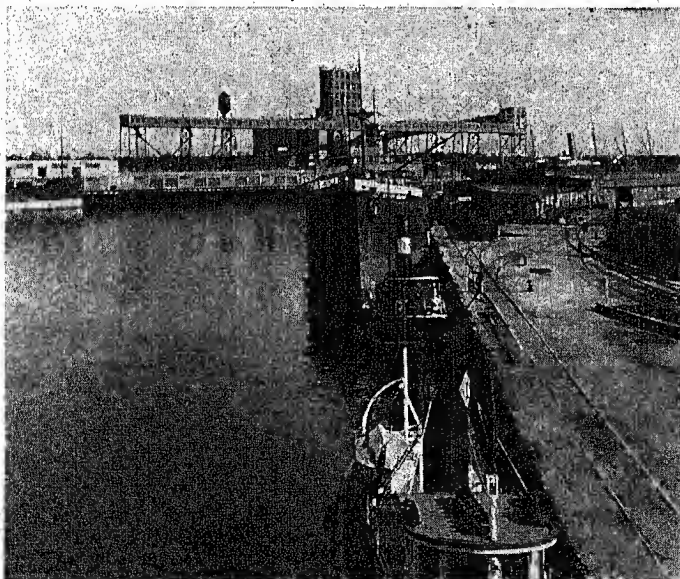
Texas plateaus rise 3,000 to 4,000 feet. For years the Panhandle was a thinly settled stock country, but with the discovery of petroleum, towns sprang up almost overnight, and forests of derricks now dot the prairies. This is one of the world's richest oil and natural gas regions. Most of its once enormous ranches

have been broken up, but stock raising still flourishes, and wheat, barley, and grain sorghum are grown. Much of the world's helium, used in dirigibles and balloons, is extracted from natural gas at Amarillo. The population of this city, close to booming oil and gas fields, almost tripled in the decade between 1920 and 1930.

The story of the Panhandle is like that of other parts of west Texas. Oil and gas fields have been brought in with astonishing rapidity. Stock farms, grain and hay farms, cotton plan-

tations, and orchards have, in most regions, taken the place of the immense ranches of the past. Cotton production especially has increased because most of the cotton-growing area is immune to the ravages of the boll-weevil. Dairying and poultry raising are fast-growing industries, as are sheep and goat production

TURNING BASIN, HOUSTON SHIP CANAL



Ships flying the flags of all nations clear from Houston, with their cargoes of cotton and petroleum products, through the canal which makes a seaport of the city by connecting it with the harbor at Galveston. Along the canal are the big oil refineries, warehouses, flour mills, and grain elevators, linked by railroads which handle the heavy traffic of a growing industrial district.

on the Edwards Plateau to the southwest. Here, too, are many deer and wild turkey. In addition to its petroleum and natural gas, west Texas has other varied mineral resources, including potash, gypsum, clays, coal, mercury, silver, lead, gold, copper, iron, salt, graphite, cement, granite, limestone, zinc, manganese, and mineral waters. With the development of railways and the rapid influx of population in the Panhandle and west Texas, manufactures are springing up, especially oil refineries, cotton mills, smelters, and natural gasoline and carbon black plants.

Fort Worth lies about 30 miles from its rival, Dallas, in the heart of the fertile black prairie region. The breezy democratic city owes its fortunes to cattle, oil, and grain. Thousands of irrigated acres border upon Wichita Falls, an oil and gas center. Out on the prairies is fast-growing Abilene, near oil fields and fine farms. San Angelo, once a post on the cross-continent mail stage route, is now an outstanding wool and mohair market. Lubbock, 110 miles south of Amarillo, has grown with the agriculture of the plains.

Rugged Lands Beyond the Pecos

Where Texas climbs skyward in the Guadalupe Mountains, across the Pecos is the wild rugged Big Bend country in a curve of the Rio Grande. Wildcats, deer, bear, and wild turkeys hide in the deep canyons. Out here one county, Brewster, is bigger than Connecticut. Great cattle herds and flocks of sheep and goats graze through this lonely trans-Pecos land. Silver, quicksilver, and some copper, gold, and lead are mined in the jagged mountains, and petroleum is found along the Pecos. In this dry air crops grow only by irrigation, chiefly beside the Pecos, and in 70,000 acres near El Paso that are watered by the great United States reclamation project at

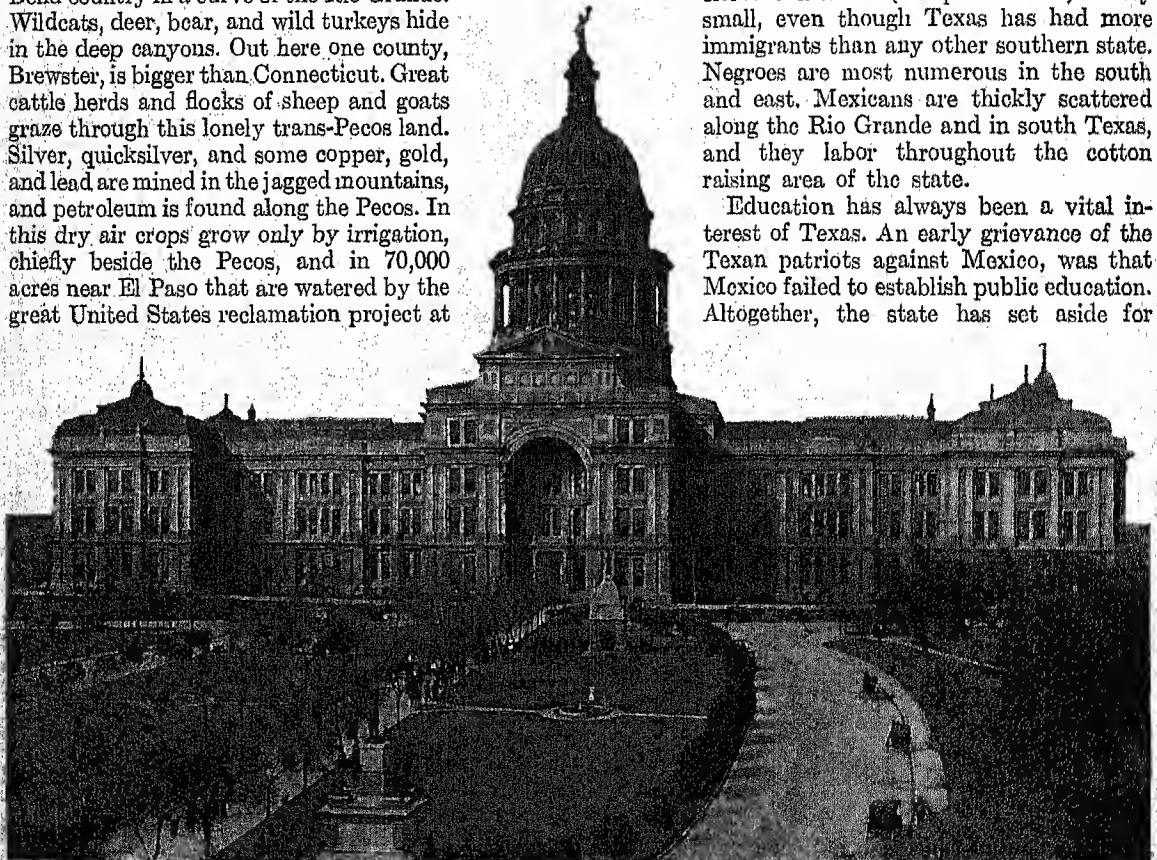
Elephant Butte, N.M. (see picture with New Mexico). Two unique industries are the manufacture of rubber from the guayule plant, and of wax from the candleilla. Picturesque El Paso, the largest city on the border, is a health and pleasure resort and has important manufactures.

A story is told of Robert E. Lee, who, with some friends, visited the Texas prairies in the early 50's. As Lee was thoughtfully gazing out over the plain, one of his companions asked him: "What do you see?" "I am listening to the footsteps of the coming millions," was Lee's answer.

Swift Growth in Population

Slowly at first, then more rapidly as Texas politics quieted and the rich nature of the country came to be understood, settlers entered. At first they came mostly from the slaveholding South; but after the Civil War, men from the North began to arrive, and in recent years many newcomers came from the Middle West. The United States census of 1850—the first after annexation—gave Texas a population of 212,000. In 20 years, it had increased to more than 818,000, by 1900 to more than 3,000,000, and in 1940 this number had mounted to nearly 6,500,000. The foreign element in Texas (except Mexican) is very small, even though Texas has had more immigrants than any other southern state. Negroes are most numerous in the south and east. Mexicans are thickly scattered along the Rio Grande and in south Texas, and they labor throughout the cotton raising area of the state.

Education has always been a vital interest of Texas. An early grievance of the Texan patriots against Mexico, was that Mexico failed to establish public education. Altogether, the state has set aside for



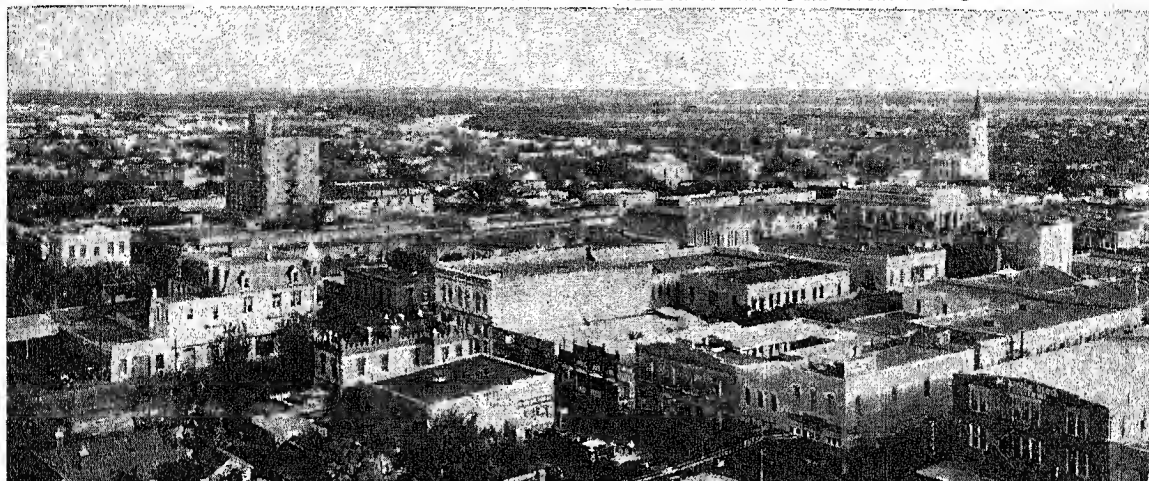
The Capitol of Texas, at Austin, stands in the center of a ten-acre square, artistically laid out. It is the largest state capitol in the United States, and is said to be one of the ten largest buildings in the world. It is in the form of a Greek cross, 556 feet long by 288 feet wide; the dome is 318 feet high and is surmounted by the figure of Liberty, holding aloft the "Lone Star" in her left hand, and a sword in her right. It required seven years (1881-88) to complete, and an expenditure of \$3,500,000. All the expenses of construction were borne by a syndicate of Chicago capitalists, who received in exchange a land grant of about 3,000,000 acres.

educational purposes a portion of the public domain equal to the joint areas of Kentucky and Ohio. As this land is sold, the principal of the proceeds is invested and only the income is used. Provision of rural schools in thinly populated areas has been the chief problem. The state teachers colleges are situated at Alpine, Canyon, Commerce, Denton, Huntsville, Nacogdoches, Prairie View (for negroes), and San Marcos. All departments of the University of Texas are at Austin, except its medical school, which is at

Later, several other missions were built farther south along the Rio Grande.

Missing the mouth of the Mississippi, where he wished to start a colony, the French explorer La Salle sailed into Matagorda Bay in 1685 and, pushing inland, built Fort St. Louis, which was wiped out by Indians in 1689. Fear of French influence hurried the Spanish into extending missions into east Texas among the Tejas, a tribe or confederation of Indians for whom the state of Texas was probably named.

VIEW ACROSS THE RIO GRANDE FROM LAREDO



Once a border town in all that the name implies, Laredo has become a thriving, modern city, in which the Spanish architecture mingles with the less picturesque American. Beyond the Rio Grande lies Mexico, with Nuevo Laredo, reached by bridges, at the right. Among the sights of the city are the public market and the old Spanish cathedral. Quaint and colorful Spanish tiles are manufactured in Laredo, and there are refineries for petroleum and cottonseed-oil.

Galveston, and its college of mines and metallurgy at El Paso. The Agricultural and Mechanical College of Texas is at College Station, near Bryan. Among the other higher institutions are Southern Methodist University, Dallas; Baylor University, Waco; Texas Technological College, Lubbock; Texas State College for Women, Denton; Rice Institute, Houston; Mary Hardin-Baylor College, Belton; Texas Christian University, Fort Worth; and the Texas College of Arts and Industries, at Kingsville.

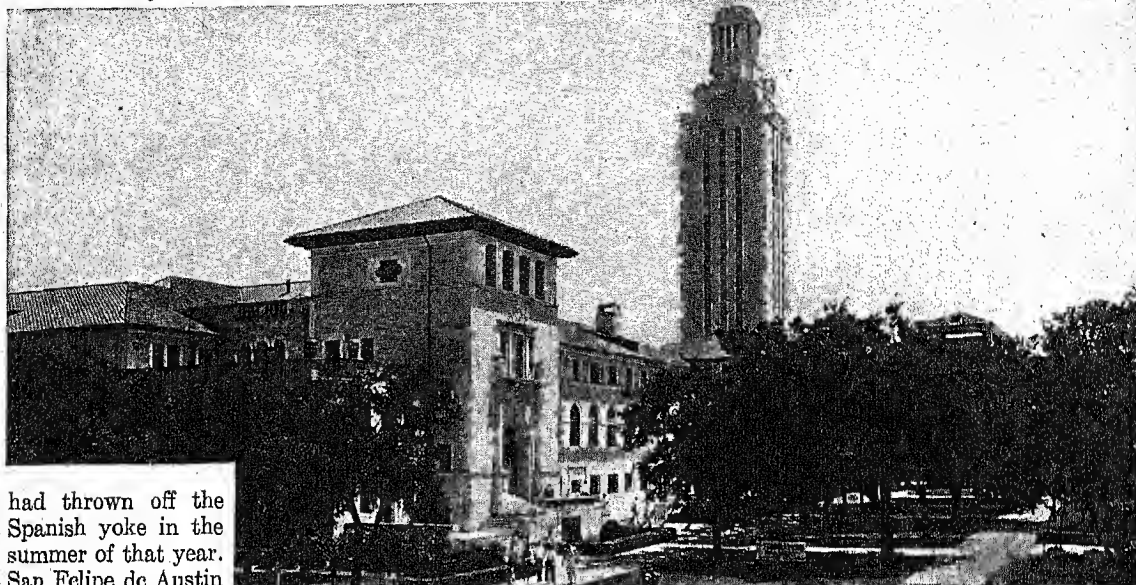
Remarkable History of the State

While mapping the Gulf of Mexico in 1519, Pineda sailed along the coast of Texas. Earliest of Europeans to penetrate the Texas wilds was Cabeza de Vaca, a Spanish noble, who was shipwrecked here, and after years of wandering (1528-36) reached Mexico City. In 1541, Coronado crossed the Texas Panhandle in his search for the mythical Seven Cities of Cibola. For the next 120 years, occasional parties of Spaniards camped in the wilderness, but no settlements were started. In fact, for nearly 200 years after its discovery, the region did not have an official name, and the boundaries were indefinite. In 1659 Franciscan fathers established a mission at Guadalupe, on the site where El Paso now stands. Settlers from New Mexico fled hither in 1680 during an Indian revolt, and the El Paso district was added to New Mexico.

Two missions, built in 1690 by Father Massanet and Captain De León near the Neches, were soon abandoned, but others replaced them after 1716. Some 25 missions and a number of presidios, or military posts, were built in Texas before the 19th century. The missions failed completely to civilize the fierce Comanches and Apaches of the west, and had no marked success with the gentler eastern Indians; also, they failed to attract settlers. After over 150 years of Spanish rule, there were only three centers of population—San Antonio, Goliad, and Nacogdoches. San Antonio, founded in 1718, was the Texas capital during the latter part of Spanish rule and all through the Mexican régime. In 1723 Texas was made a separate province of New Spain.

After the Louisiana Purchase in 1803, the United States regarded east Texas as a part of its territory; but Spain refused to recognize the claim and was given undisputed control through the Florida Treaty (1819-21). The gate to American colonists swung open, however, in 1821 when Moses Austin, a Connecticut Yankee, won Spain's consent to settle 300 families in Texas. Shortly after Austin's death, his able son, Stephen Fuller Austin, called "the father of Texas," brought the first American settlers to the lower Brazos in December 1821 (*see* Austin, Stephen Fuller). Texas now flew the banner of Mexico, which

ON THE CAMPUS OF THE UNIVERSITY OF TEXAS



This shows the west entrance to the campus, with the tower of the new library and administration building in the background. In the foreground is the Texas Union Building, a recreation center.

had thrown off the Spanish yoke in the summer of that year. San Felipe de Austin was the capital of the American settlement

after 1823. Its population increased very rapidly.

Mexico was friendly to Americans for a time and made a number of land grants to settlers. However, as immigration from the United States increased, Mexico grew more hostile. Resentment flared in 1826 when American promoters set up the short-lived Fredonian republic at Nacogdoches. By 1830 the population of Texas had risen to nearly 25,000, and further American immigration was forbidden. Disputes with Mexico increased. In 1835, after Santa Anna established a dictatorship over chaotic Mexico, the Texans revolted.

In hourly fear of hostile troops, pioneers met in convention at Washington on the Brazos on March 1, 1836. The declaration of independence from Mexico on March 2 charged that Mexico's rule was despotic, and that Texan interests had been neglected. A constitution modeled after that of the United States was drawn up for the new Republic of Texas.

The heroic but unsuccessful defense of the Alamo was the most striking event in the Texas war for independence. In the stone-walled yard of this Franciscan church and monastery, founded in 1718 in what is now San Antonio, about 180 Texans for 11 days resisted a Mexican besieging force of nearly 4,000 men with several cannons. The Alamo fell, after a desperate hand-to-hand fight, on Sunday morning, March 6, 1836. Six people who were in the fort at the beginning of the battle were spared by the Mexicans—three women, two children, and a negro boy—but not a single soldier. Among those who were killed were the frontiersman David Crockett, Col. James Bowie, for whom the bowie knife was named, and the valiant commander, Lieut.-Col. W. B. Travis. Later in the month, the Mexicans massacred more

than 300 Texan prisoners at Goliad. "Remember the Alamo" and "Remember Goliad" then became the war cries of the Texans. Independence was practically gained when Gen. Sam Houston defeated and captured Santa Anna at San Jacinto on April 21, 1836 (see Houston, Sam).

For ten troublous years, Texas held her own as an independent republic, recognized by foreign countries and by the United States. Her first national flag was of azure, with a central golden star—the "lone star" of its nickname. The young nation, rich in land but poor in cash, found the cost of an army and navy heavy. It was hemmed in by the Indian frontier over the prairies from the Rio Grande to the Red River, and by the Mexican border along the shifting Rio Grande. Defenseless outlying settlements were points of attack. The emergency gave rise to the famous Texas Ranger, who could "ride like a Mexican, trail like an Indian, shoot like a Tennessean, and fight like a very devil." The first rangers were recruited in 1835. They were reorganized in 1874 as both soldiers and peace officers, and in 1935 were made a branch of the Department of Public Safety, charged with enforcing the criminal laws.

Admission to the Union

After a bitter controversy over slavery, Congress admitted Texas to the United States in 1845. The state kept its public lands and reserved the right to divide into no more than five states, a right which has caused agitation from time to time. Disputes with Mexico over the boundaries of the new state brought on the Mexican War which officially established the Rio Grande as the international boundary as far as El Paso (see Mexican War). Other disputes over boundaries have arisen from time to time between Texas

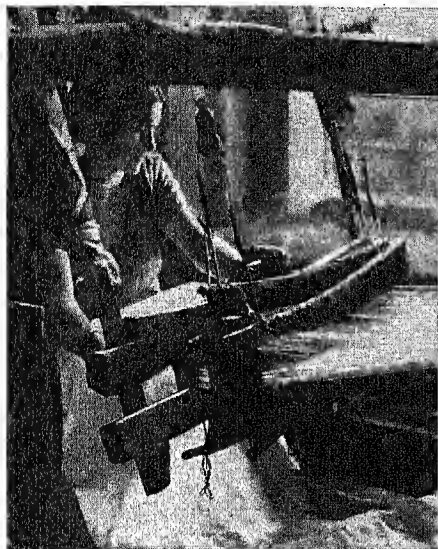
and neighbor states. In 1850, Congress purchased from Texas for \$10,000,000 the claim of that state to some 100,000 square miles now included in New Mexico, Oklahoma, Kansas, Colorado, and Wyoming.

Immigrants poured into the new state, and wealth grew apace. When the Civil War came, slaveholding Texas seceded and joined the Confederacy despite Sam Houston's struggle to keep it in the Union. The last battle of the war was fought near Palo Alto May 13, 1865, after Lee's surrender.

Texas has had four constitutions, the first of which was adopted in 1836, the latest in 1876. The governor has more power than in other states; he appoints the secretary of state and other officials. His term is two years. The legislature meets biennially; senators serve four years and representatives two years. One of the nation's first woman governors, Mrs. Miriam A. Ferguson, was elected in Texas in 1924. The state celebrated its centennial with an exposition at Dallas in 1936 and 1937.

Textiles and Embroideries

*History of World
Is Woven
Into Fine Fabrics
and Told in
Rich Embroideries*



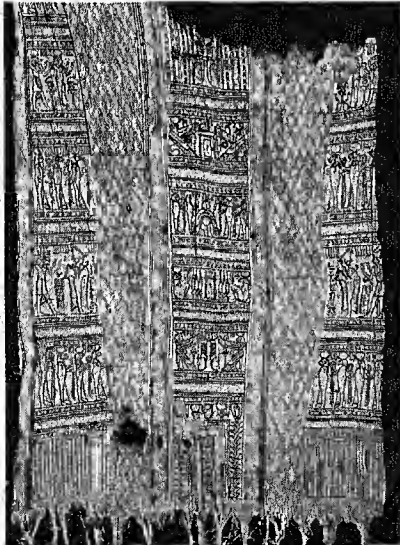
The first woman who ever idly twisted a bit of fluffy wool and found that it made a thread must have soon equipped herself with some such distaff as that of the old woman spinner of Assisi, Italy, at right. One of the most primitive of looms is used by the Greek girl weaving home-spun thread into cloth, at left.



TEXTILES AND EMBROIDERIES. Some 2,500 years before the Christian era, the Egyptians knew how to weave. They could make the finest and sheerest fabrics from the cotton and linen they had long since discovered. Some of their cloth has been preserved for us by their burial customs. They believed that a dead person had to carry useful things with him into the next world. In the tomb they placed furniture and fine jewels, a carriage, and a bed, and decorated the walls with scenes from everyday life. On one such wall painting we see exactly the kind of loom they used. We can also study fashionable costumes and the patterns printed or embroidered on them. Their favorite motif was the lotus, or water-lily of the Nile, which had a religious significance. Waves were represented by a zigzag, and the sacred beetle of good luck was usually tucked in somewhere. Though there are no complete costumes left from quite that

long ago, we do have actual examples of their skill at weaving. The dead were made into mummies wrapped in fine linen, very sheer and sometimes 60 yards long.

SCENES FROM THE FUTURE LIFE

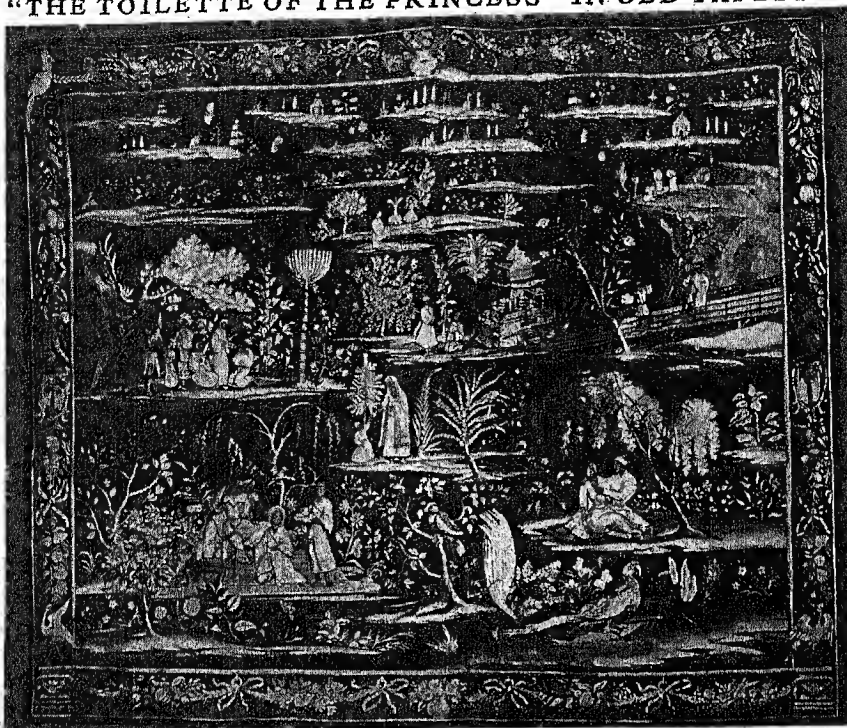


On the shrouds of ancient Egyptians were inked scenes and symbols like these revealing their beliefs about life after death.

The next important age in a historic survey of textiles is in Greece, in the 3d, 4th, and 5th centuries before Christ. From the brilliant decorations of Grecian buildings, we learn of the style of costumes they wore. They were made apparently of linen or cotton or wool, and they always hung in many soft folds. A design across the bottom of the tunics, in geometric fretwork or zigzag patterns, was either woven or embroidered. Silk was mentioned by Aristotle, but was not in general use until early in the Christian era.

Probably most real to us, among all the stories of ancient days, are those of the Roman Empire. We read of gorgeously arrayed emperors, so we know that somewhere the looms were busy. Probably very few of these beautiful fabrics

"THE TOILETTE OF THE PRINCESS" IN OLD TAPESTRY



Made for Elihu Yale in the late 17th century from a Chinese design in London, this fine old tapestry takes for its color scheme the tones of mother-of-pearl on dark lacquer. It is now at Yale University.

were made in Rome though the Romans used more silk than any country outside of China. These rich fabrics were brought there at great expense from the textile centers of the East.

That brings us to the story of silk in China. There is a pretty tale of the dainty little Chinese empress who first spied the fine thread with which an ugly worm was spinning himself a cocoon (*see Silk*). Her interest grew day by day until she finally unraveled the cocoon and so made the first usable silk thread (about 2600 B.C.). The Chinese jealously kept the secret of this discovery, for they were the only people in the world who knew how to twist silk and weave it into rich and lovely fabrics, including brocades and a cloth like damask. With innate artistic skill they combined colors to make beautifully woven fabrics and embroideries. The art of embroidery, or creation of patterns by the application of other threads on the surface of a fabric, seems to go back almost as far as weaving. The dragon was a favorite motif and the famous Chinese key or fretwork appears time and again, as do the exotic birds and flowers.

Japan Learns Chinese Secrets

Other countries were eager to learn how these lovely textiles were made. Though the Chinese did their best to preserve their secret, the knowledge spread to Japan and also south into India. Japan now is almost as famous as China for silk but uses different patterns. The Japanese like to weave ladies with weird head-dresses and long sweeping kimonos, cherry and plum

blossoms, and even their sacred mountain, Fujiyama, with designs as fine as those in Japanese pictures.

In the 5th century Egypt, having been Christianized, comes into our history again. These later Egyptians were called Copts. Many remnants of Coptic weaving have been preserved in their tombs. Their methods of weaving were cruder and their cotton and linen coarser than those of the early Egyptians. They wore a plain, coarse linen for their garments, embellished with a kind of woven decoration resembling tapestry. Long bands hung over the shoulders, circular or oval medallions, in bright colors and simple designs, decorated the sleeves as well as the lower front of the tunic.

Strange to relate, about this same time (500 A.D.), the natives of Peru, on the far side of South America, were using the same methods of textile making as the Copts in Egypt; and stranger still, the Peruvians

INTRICATE STITCHES OF CHINESE EMBROIDERY



On a panel of old blue satin of exquisite color, the deft Chinese embroiderers have worked in pastel silks the design of landscape and human figures, uncentralized and decorative, executed in fine chain stitch and satin stitch.

employed the same characteristics of pattern and color as did the Copts. A peculiar kind of tapestry was worked out in both countries at about the same time. This does not indicate that workmen from one country traveled to the other but it does show that if primitive people start with the same equipment at about the same time, they may produce the same results. A need for clothing comes first, then a way to weave, and, lastly, a way to decorate. The Peruvians, too, developed embroideries and intricately woven patterns that are still reproduced by their descendants.

Traveling back again to the Mediterranean countries, we find great progress in Persia under the powerful Sassanid kings. Until the 7th century the Persians developed commerce with the Far East, and brought the raw silk from China. Of it were woven fine damasks (named from Damascus, where they were made), a cloth on which a pattern appears in a satin weave against a plain ground; and brocades, similar to damasks except that the pattern was also made to stand out in relief, by tensing the threads. The first brocades were all of gold, and the name was retained after they were made in silk, with or without gold threads. They were used as hangings in spacious tents, for cushions piled on rugs, for drapes on table or chest, or as clothing for both men and women. No fabric was too rich for the taste of the time.

With such a demand, entirely new designs were created. Large circles called roundels usually enclosed the pattern. Within this ring two strange stiff animals stood back to back, but with their heads twisted around so they could glare at each other. In others lions or birds with widespread wings faced each other. More ambi-

A TSUZURE-NISHIKI BROCADE



This beautiful piece of Japanese brocade of the late 18th century was used as a wrapper for gifts.

tious artists drew figures of warriors on horseback, usually shooting at a near-by lion. All of this was done in a highly conventionalized manner, sometimes not easily recognizable.

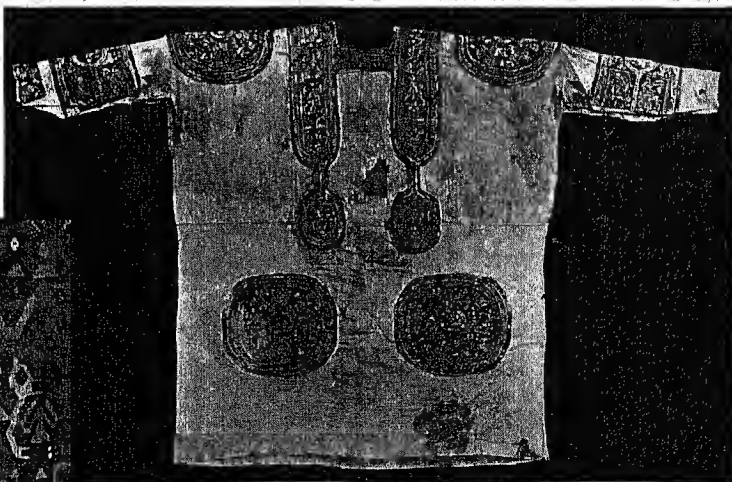
These lovely Persian silks went traveling, too, especially to Constantinople (then called Byzantium) where lived the Eastern emperors. They had magnificent courts where bright, rich fabrics were much in demand. Some textiles were made there but most of them came from Persia or China. The patterns of these Byzantine silks were like the Persian. The roundel motif lasted for many centuries with variations in different countries.

Following close on this bit of Persian history, we have the story of the great Mohammedan conquests (see Mohammed), which revolutionized art design, for the prophet forbade the picturization of any living thing. So away went all the old roundel patterns, with fighting warriors, jumping lions, and flying birds.

The Origin of Arabic Designs

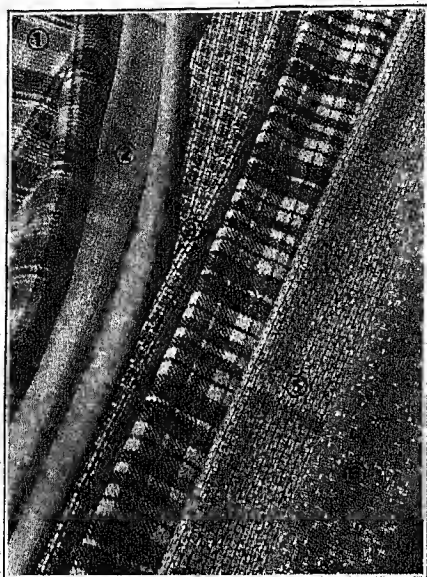
New designs had to be worked out and once again the artists took the materials at hand. The words and laws of the prophet were all written in picturesque Arabic script, so the artists filled the roundels with inscriptions from their holy book, the Koran. Inside the roundel they piled letters one on another thus creating a type of very beautiful abstract design to be seen also in their architecture, rugs, and pottery.

THE STRANGE LIKENESS OF DESIGN IN EGYPT AND PERU



The design from a poncho at left, woven by the natives of Peru, with its geometric men and animals, closely resembles in detail the embroidery on the tunic of Coptic make found in one of the tombs of upper Egypt, though the two peoples had no contact.

SOME MODERN WEAVES AND PATTERNS



KEY TO COLOR PLATE

THE varieties of texture and pattern shown on the opposite page are produced with woolen threads by variations of only two weaves, the basket or plain weave and the twill weave.

The cloths can be identified readily through the key-picture at the left. The plaid tweed (1) is a coarsely woven cloth made from homespun yarn. Its plaid pattern is produced by regular spacing of variously colored threads in the plain weave. The plain yellow basket weave (2) is made of smooth, fine wool threads, producing a soft dress material of fine wearing quality.

Next (3) we see a variation of the basket weave, accomplished with medium-sized strands in color pairs that alternate in the over-and-under arrangement. The twill weave produces the diagonal background lines in the black and white plaid cheviot (4). A cheviot is woven of harder, firmer yarn than tweed, and the result shows a crisper, less woolly-looking surface. Note how the solid black appears when both warp and weft threads are of that color; the solid white when warp and weft are white, and the gray where the two colors cross.

The green tweed (5) in contrast to the first cloth shown suggests how the mere alteration in the spacing of the threads of different color can produce an entirely different kind of pattern. The nobby tweed (6) is woven with threads of uneven thickness. The wool crêpe (7) is produced by a very close weave with unequal tension on warp and weft threads.

Though most of the tweeds, cheviots, and other rough "outdoor" or "sports" textiles originated in Scotland and England, these samples are all from American mills which have come to equal and in some cases to surpass the imported fabrics.



Direct-color photograph

See text on opposite page

SOME MODERN WEAVES AND PATTERNS

When these conquering Arabs reached Spain they were called Saracens (meaning "easterners"). Their designs they mingled with the native art of conquered Spain. Interlacing lines, geometric figures and patterns, flowing arabesques, and above all a pseudo-Arabic script united with the earlier Spanish motifs. But, of course, since the Spaniards were not Mohammedan, their designs included figures of men and animals as well as the geometric patterns. Heavy silks lent themselves well to this type of pattern, but apparently were not quite gaudy enough to suit these color-loving people. So they added threads of real gold and silver, producing some of the world's most brilliant and lustrous fabrics.

Beautiful Silks of Palermo

The conquering Mohammedans visited Sicily, too, where there was already a well-established textile business. Some traces of their abstract design were left there but only as a minor influence. The weavers of Palermo were famous for their beautiful silks with big, flowing designs, which had gradually evolved from the roundel. Wide waving bands which had formed circles developed into elongated ovals with pointed ends. The flowers were no longer strange and conventional, but more realistic. As the patterns grew less severe, the silks became softer and more pliable, less stiff and formal. Dainty colors were used, light blue and yellow instead of red and old gold and olive green. Houses were gradually made more livable, and into the houses went these rich textiles. Some of the Palermo fabrics still showed the influence of Mohammedan workmen, but the picturesque inscriptions were meaningless. Sicily was important as a weaving center until the 13th century when a new government drove the weavers out to various towns in Italy.

The greatest number settled in Lucca in northern Italy. They brought with them their own ideas and designs, but these were soon combined with the patterns and weaves already established. There in Lucca we find the beginnings

of the famous Italian Renaissance silks, still copied the world over today (see Renaissance).

Florence, too, became a great textile center, for gathered together in that city were some of the finest artists and artisans the world has ever known. From the looms of Florence came the rich crimson damasks, brocaded silks of many colors, the gold brocade that is seen so often in the background of a painting, and the famous blue satins rivaling Italian skies. The patterns were bold, beautiful, and as graceful as the finest artists of the time could make them.

Venice is a city unique in the world. To this great seaport sped the first traders from the East with their shiploads of silk. In the beautiful palaces lived some of the world's richest people who wanted costly silks for hangings, banners, upholstery, and clothing. Venetian artists had new ideas for patterns, which were in turn copied by eastern weavers. Venetian style, therefore, was a natural combination of eastern and western motifs. These rich, glossy fabrics were in reds, blues, gold, and some exquisitely embroidered with threads of real gold.

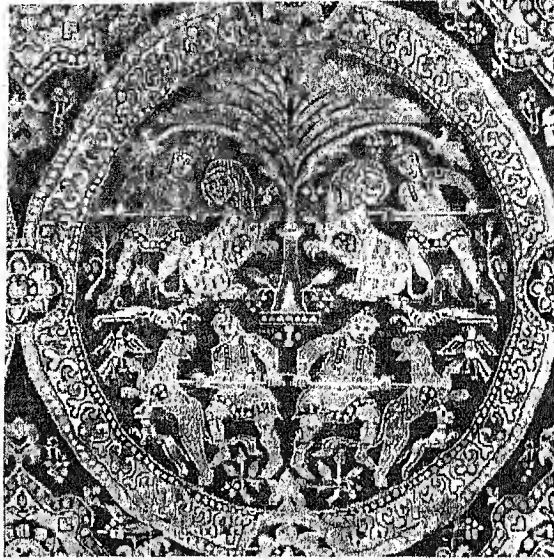
Genoa was another seaport, but not quite so convenient to the merchants of the East as Venice. Many weavers driven out of Lucca and Florence settled there and worked on a special type of velvet of silky pile and gay colors. Bold sweeping designs combining cut and uncut velvet stood out vividly against rich satin or brocaded backgrounds of white. Small all-over patterns, suited for a dress, for covering a chair, or for hanging on the wall were also popular.

The French Take the Lead

The glory of Italy was not to last, for soon the center of gay social life moved to France. Some of the most talented artists of the Italian Renaissance went to the French court under Francis I.

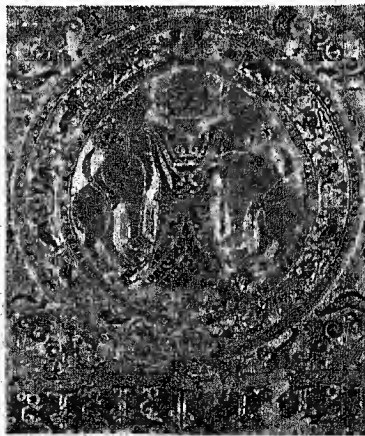
Regal palaces needed rare tapestries and beautiful brocades and damasks. French patterns were so much like Italian that sometimes it is difficult to tell where a piece was woven. The creative world migrated

A LION HUNT OF THE EIGHTH CENTURY



A treasure of the Vatican is this scrap of Persian silk, woven in the 8th century, showing a lively lion hunt. It is a beautiful example of the roundel motif, which was carried to many lands.

THE ROUNDEL IN SPAIN



This roundel is part of a Spanish tapestry dating from the 11th or 12th century. It shows the influence of early oriental designs on the textiles of the West.

north from Italy. Great artists appeared in Germany and Holland, fine tapestries were made in Flanders, but the most beautiful fabrics came from France.

Tapestries are heavy fabrics with inwrought designs (*see* Tapestry). From fragments found in Theban tombs we know that the Egyptians made tapestries as early as 1400 B.C. Although these specimens indicate a developed art, no others of such antiquity have been found. By the beginning of the Christian era, this method was an important, if not indeed the principal, method, of producing textile patterns.

The history of European tapestries falls into three periods. The 13th, 14th and 15th centuries provided the greatest of the Gothic tapestries, made mostly in France and Flanders. Primarily for use in churches, they were woven with large pictorial patterns of religious significance. Their wide floral borders led to the famous *millefleur* (literally "thousand flower") tapestries of the late 15th century.

By the beginning of the 16th century the Gothic tapestries were quite out of style, for the Renaissance in Italy had established an entirely new ideal in all arts. Raphael made some of the finest designs but they had to be sent north to be woven, for Italian

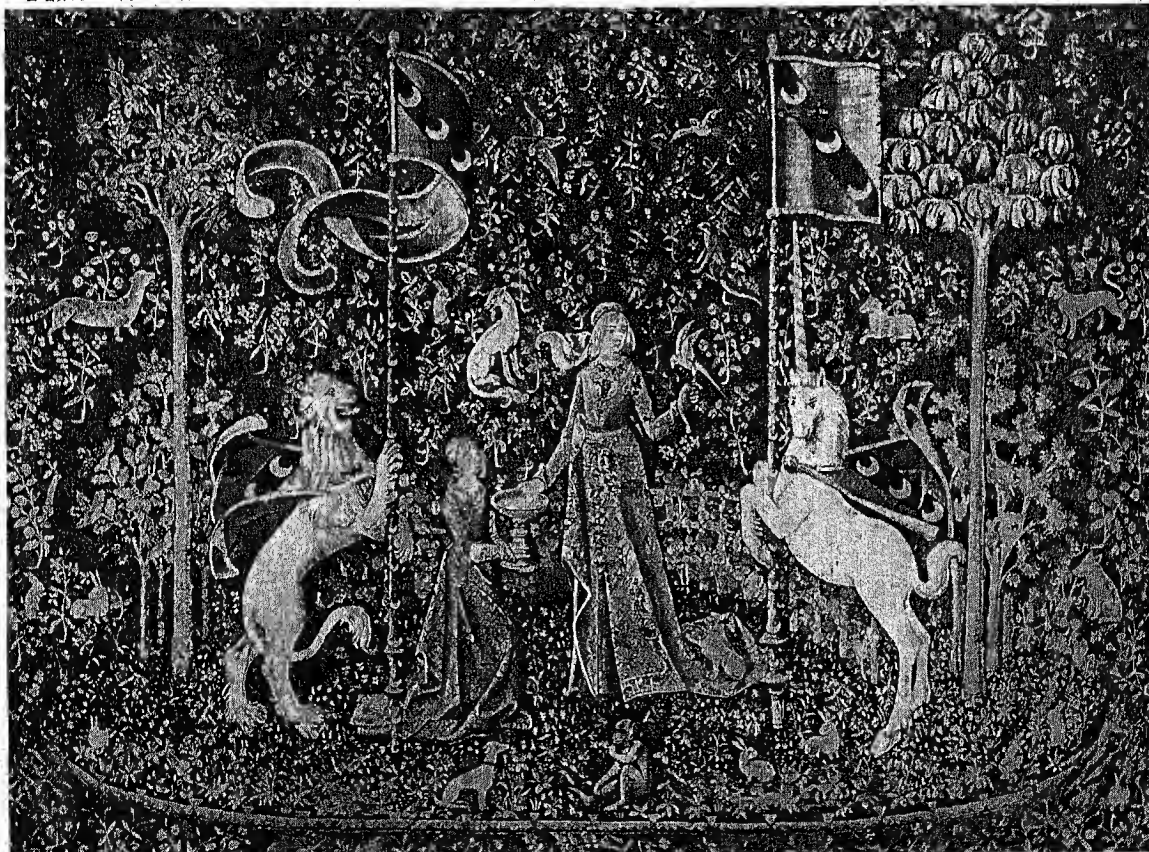
craftsmen were not yet skilled in this style of weaving. The tapestries of this era were more purely decorative, sometimes with wide woven gold borders resembling picture frames. The designs were bold and full of life and movement. Many illustrated an old tale, either Biblical or classical.

The third era is that of the Gobelins. Under Louis XIV in the early 17th century a royal factory was set up. The work turned out there was not only pictorial, but also included small semi-floral pieces for furniture. Their large wall coverings are full of light and color and the illusion of reality.

Cotton Fabrics in the Far East

Most of the fine fabrics we have been considering were of silk, and the tapestries of wool. Now we come to the story of cotton. You remember that the Egyptians used it, and the Greeks and Romans, too. Then as a medium for beautiful textiles it went out of fashion. The poorest coolies in China, the rug-weaving peasants of Persia and Arabia, the soil-tilling people of Europe were wearing cotton clothes but these were not decorative in pattern. India, however, had used cotton for hundreds of years and printed it with a distinctive pattern of formal, unrealistic design.

"THE LADY AND THE UNICORN" ON A MILLEFLEUR BACKGROUND



Five tapestries of the 15th century, representing the five senses, glow on the walls of the Cluny Museum in Paris, their deep red backgrounds sprinkled with gay spring flowers, in the famous "Millefleur" style. The tapestry above, with the two ladies carrying a dish of food, represents the sense of taste. The white lion and the unicorn carry medieval banners, and the background, quite indifferent to perspective, is full of amusing little animals, rabbits, dogs, lambs, monkeys, and cats, among the flowers.

In Java and other South Seas islands, the natives made a fine cotton cloth, which they dyed in "batik" (meaning wax painting). The pattern is made by painting part of the fabric with a hot solution of fat and bees-wax. Immersion in cold water hardens the wax, so that the dye will not penetrate the waxed part. Patterns in many colors may require rewaxing for each color. A wad of cotton or a brush is used to fill in the large spaces with wax, but the outline is either drawn first with charcoal or is applied by a special tool, a small copper cup with a spout. The patterns are mostly conventionalized flowers and animals, but human figures are also used.

The Indian patterns were more natural. The one best known is called the "Tree of Life." The tree bears a variety of fruit and flowers and sometimes strange animals cover the rolling slopes of the earth. Other small floral patterns and occasionally birds fill in the remaining space. A small, all-over pattern with tiny flowers or leaves or a conventionalized pattern scattered over a white ground was called a "chint." The merchants of the East India Company, in the early 17th century realized that the ladies in England would like "chints," so they imported them in great quantity and chints became the vogue. Today we call them chintzes.

The success of cottons gradually spread all over Europe. The most famous prints outside of England came from France. Near Paris in the village of Jouy, Christophe-Philippe Oberkampf set up a small factory where at first he himself did all the work. His fabrics, known as "toiles de Jouy," were printed in one color, usually red, on a soft creamy white cotton. The patterns were mainly pictorial, one of them showing the entire process of manufacture. Others included small outdoor scenes or amusing fables. They were also printed in blue or brown or green or purple in addition to the popular red.

Development of Embroidery

Another important phase of textile history to be considered is embroidery as done by the English ladies of the 16th and 17th centuries. As already noted, embroidery began almost as early as weaving, but its popularity seems to come and go in cycles. The famous Bayeux tapestry, the pictorial story of the Norman conquest, is not tapestry at all, but embroidery supposedly made by Queen Matilda, wife of William the Conqueror. Other beautiful English embroideries were

THE POPULAR "TREE OF LIFE" DESIGN



done during the 13th century but it was not till about 1525 that they began to be popular for use in homes. The colorful effect of the crewel embroidery was gained by stitches of different lengths worked against a natural linen background in bold floral patterns. A little later another type of needlework came into prominence, the so-called *petit point* and *gros point*. Madame de Maintenon had set the style in France and it spread over to England. It covers the ground entirely with small stitches like modern cross-stitch. The very finest, usually of silk, was called *petit point* while the larger stitches used for backgrounds and foliage was



The lower picture is an India print of the famous "Tree of Life" design. Above is an English copy of this pattern done in crewel embroidery on a bed cover. Its many-colored stitches stand out in soft shades of blue, green, brown, and red, against a white twilled ground. American crewel work derived from this.

called *gros point*. The patterns were pictorial or floral or both.

Now we must go back to the story of French fabrics and carry them on through their most important era. Louis XIV ruled from 1643 to 1715, and it is during this long reign that we find the greatest advance in textiles. He built the magnificent palace of Versailles and had brocades and damasks woven specially for it. Fine tapestries were made at Beauvais and by the Gobelins factory.

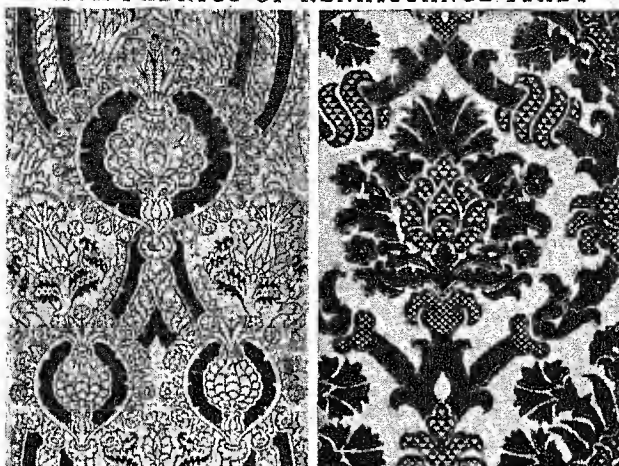
All the court followers tried to copy the royal style in furnishings and in the gorgeous designs of the costumes they wore at the palace fêtes.

From Classic to Romantic Designs

The early Louis XIV patterns developed from the Renaissance, and the later period added scrolls and curving conventionalized floral decoration. The classical basis is there with a bit of French grandeur on top. The weavers set up at Lyons under Francis I were busier than ever turning out magnificent silks. Then came the revocation of the Edict of Nantes in 1685, when hundreds of families of weavers were driven from France to Flanders and England, enriching those countries by their skill.

There is a gradual change in textiles from the 17th to early 18th styles. The full grandeur of the Louis XVI era was easily expressed in heavy damasks and brocades, with bow-knots of ribbon mixed with extravagantly unreal trellises and fountains. The introduction of oriental motifs led easily into the fine Louis XV style. As oriental ornament is pure and clear in line, the designs had to be simplified. So in this

RICH FABRICS OF RENAISSANCE ITALY



In 15th century Florence, heavy brocades like that at left adorned the splendid palaces. The bright, showy design in figured velvet, at right, was a special product of Genoa in the same period.

early 18th century we find daintier fabrics. Patterns lost their classical foundation and became purely romantic, slipping easily from ponderous heavy lines to dainty, graceful ones.

The same palaces had to be redecorated with new fabrics. It was still an age of extravagance, and brocades became even more gorgeous, but in a lighter, daintier way. The looms at Lyons were busier than ever. Taffetas embroidered with bright nose-gays became the vogue, both

for costumes and for interiors. As one of the court favorites was deeply interested financially in the East India Company, she introduced the fashion of decorative cotton prints. They caught on quickly and many a court lady wore a bright flowered print that exactly matched the curtains and wall coverings of her boudoir. The whole style showed a lack of symmetry and definite distinction between background and design, with the curious one-sided effect of some furniture of the period.

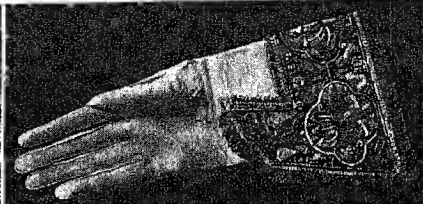
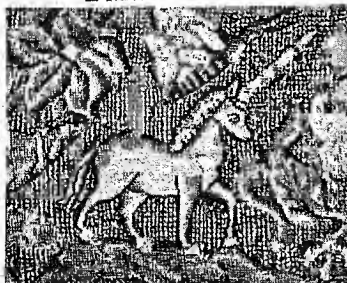
CHINESE PATTERNS IN ENGLISH CHINTZ



The gymnastic Chinamen skipping the rope, swinging in swings, and walking the tight rope to the delight of the squirrel and monkey are a frivolous English adaptation of Chinese decoration.

Near the end of the century before the downfall of the French kings there was another change in style, another reversal to classical ideals. But this time it was not like the Renaissance. The classical details were added to the fragile structure of a fabric originally planned for unbalanced floral motifs. Stripes were seen everywhere, with small bouquets placed here and there with neat precision. Straight lines predominated, instead of curves. Decorative details included gardening tools, musical instruments, hunting equipment, ribbons and garlands, and medallions with classically draped figures. Toiles, too, were very important at this time,

EMBROIDERIES AND FABRICS FROM VARIOUS CENTURIES



At the left, a 17th century petit point embroidery, with gros point background. Center, glove of a medieval king's champion, done in gold thread. Right, a Louis XVI brocade.



for dresses and for interiors. Tapestries grew smaller and patterns were finer and daintier. The taste grew for things in miniature.

While these exquisite fabrics were being made at Lyons, England began to grow as a weaving center. Many of the weavers who left France in 1685 settled there, particularly in Spitalfields, a small town just outside London. Most of the early 18th century patterns showed a definite French influence, later submerged in the English taste. From 1725 to 1750 they made brocades and damasks which while distinctly different in style were as fine as the French.

But England kept her place in the textile world, not so much for her beautiful silks, as for her decorative linens and chintzes. The East India Company had started the fad and when imports were forbidden, native factories boomed. They learned how to do roller printing, but even to this day, the finest linens for decorative work are all printed by hand. The chintzes varied from the small patterns originally inspired by the Indian ones to larger, more formal patterns typical of the middle 18th century.

The hand-blocked linens showed large floral sprays of pleasing colors. Towards the end of the century with the revival of the classical interest which produced the Louis XVI style in France there was a definite trend in that direction in England. Medallions were designed with classical heads, a curving garland swinging from one to another which looked quite like the French ones. Small designs, symmetrically placed, characterized the taffetas, brocades, and damasks.

The prim, discreet patterns are easily adapted to a variety of settings and are often seen today.

The 19th century adds little to our history. In France, Napoleon demanded strong colors and precise geometric patterns, unrelieved by grace of line. Green, blue, and red were his favorite colors and therefore the favorites of the whole court as well. The 19th century in England brought first a reflection of Napoleonic taste and then a complete reversal to realism. Photographically lifelike reproductions of flowers were printed on linen, cotton, or silk. Under the reign of Queen Victoria the style reached the worst phase. It must have been with relief that the weavers and printers turned back to previous patterns.

Modern Designs

The modern trend in art is being widely applied in both woven and printed designs in cloth, rugs, and laces, with striking and beautiful new effects. Many of these designs are geometric, with triangles, rectangles, or straight lines boldly employed. Others show highly stylized scenes, bits of city life, or common, every-day objects imaginatively treated. (See Interior Decoration.)

A TOILE DE JOUY OF MILLER, SON, AND DONKEY



The old fable of the miller and his son who took so much good advice about getting their donkey to market that they ended by carrying him is shown in this red toile de Jouy, made by Oberkampf in 1785.

Just as the Renaissance tapestry weaver might show a scene of the building of the tower of Babel, and represent all the workmen dressed in the style of 16th century Florence, so the designer today does not hesitate to make use of the clothes, machines, streets and buildings of today for decorative purposes. New art can not be created by timid copying of the past. It was not so created in times gone by, and never did a new era so cry out for new art as our own.

The Principal Kinds of Cloth

THE weaving, felting, or knitting of fibrous material, such as wool, cotton, silk, or linen produces cloth. It is made by reducing the material to fibers, cleaning them, and combining them into fabric. The animal fibers are wool, silk, and hair. Felt is made from the hair of the cat, beaver, rabbit, vicuña, camel, horse, cow, or goat. The angora, cashmere, and alpaca goats

ing). Among the commoner weaves are plain, twill, satin, pile, basket, rep, moiré, and brocade. Cloth varies as to the tightness of the twist of its threads, their fineness, rough or smooth finish, and nap.

Varieties of Woolen Goods

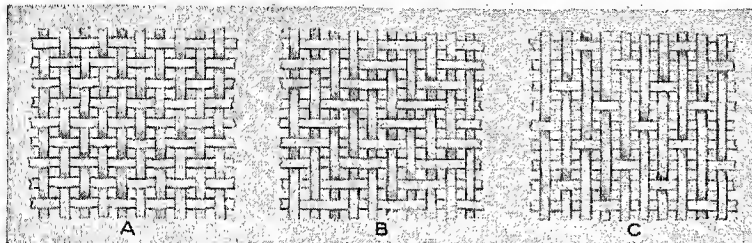
Wool may be woven into broadcloth, flannel, serge, tweed, and into many other fabrics whose trade names vary from year to year. Worsted, named from Worsted, England, differ from woolens in having their wool fibers combed into parallel order before being twisted into yarn. Cotton is sometimes combined with wool or silk, not necessarily to the detriment of the fabric, as all wool is too soft to offer resistance to hard wear.

In "velvets," besides the ordinary warp and weft threads, an added weft is inserted composed of little loops so close together as to

hide the web. The loops are then cut evenly, so the ends stand up and have the appearance of short fur. When this nap or pile is long, the fabric is called plush. A coarser example of this looping of the extra thread is found in Turkish towels. Real velvets are made of silk fiber, the cotton cloth of the same weave being called "velveteen," or, if ribbed, corduroy.

"Damask" is a fabric originally manufactured in the city of Damascus, in Syria, from which it takes its name. It was made of silk and was distinguished by its ornamental woven figures of fruits, flowers, ani-

THREE COMMON WEAVES OF CLOTH



The basket weave, simplest of all, is shown at A, with the weft running under one warp thread and over the next. B shows the twill weave, and C the satin weave.

furnish the hair woven into cloth of those names.

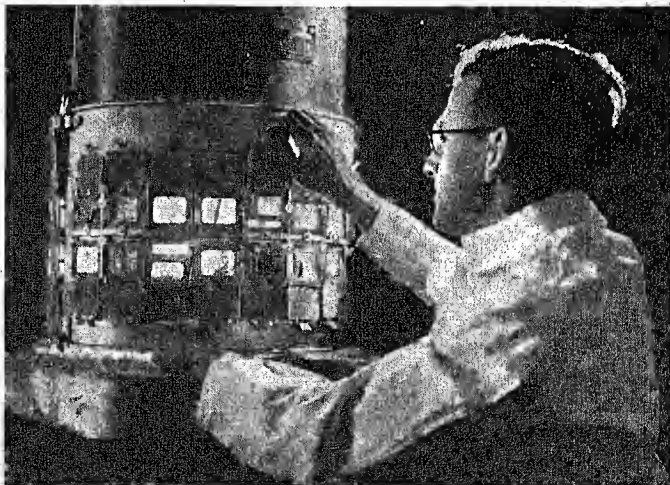
Vegetable fibers include cotton, flax, jute, hemp, ramie, pineapple, coconut (coir), kapok, istle, Manila hemp (abaca), sunn, maque, olona, pulu, and hennequen. Rayon is a fiber made artificially to resemble silk (*see Rayon*). Asbestos, metals, and glass likewise can be made into fibers and woven.

Silk has the longest fiber, from 500 to 1,200 yards. The flax fiber is from 12 inches to a yard, wool from 4 to 10 inches, cotton from one-half inch to 2 inches. Silk is the strongest, wool the most elastic, and these will retain a dye better than cotton or linen.

Felting and weaving are ancient arts, but the process of knitting does not appear to be more than three or four centuries old. Felting is simply the matting together of the fibers so that they are held by their own roughness or curl. Wool has a rough scaly fiber and thus mats very readily, but it is often mixed with hair or cotton for cheaper felts. The modern mechanical process of felting was invented by an American, J. R. Williams, about 1825. The wool is formed into thin sheets, and a number of these sheets are piled together and pressed between rollers. Carpets and table-covers of felt are made in colors and printed with patterns. Felt made from various furs is also used in the manufacture of hats (*see Hats and Caps*).

Weaving had its beginning among primitive peoples in the twisting, braiding, and weaving together of grasses and coarse plant fibers in order to make simple garments, floor mats, and other articles. All woven fabrics have lengthwise threads, called the "warp," as a foundation; and over and under the warp pass the threads of the "weft" (or "woof") (*see Spinning and Weav-*

FINDING OUT WHICH CLOTHS FADE



Bits of cloth placed in the rays of the carbon arc lamp inside this device undergo a severe trial of the fastness of their colors than if they were exposed to July sunlight. This testing machine is used by the research department of the American Institute of Laundering.

mals, and landscapes. The term is now applied to stuffs made for table-covers, draperies, and furniture coverings which have patterns woven in the loom. Brocade is a similar cloth woven with raised figures.

SILK, THE ARISTOCRAT OF FIBERS; HEMP, THE PLEBEIAN



Great trays of cocoons come from the steaming rooms, where the larvae are killed, to dry in the sun, while stirred by the brown hands of turbaned workers in Kashmir. This is one of the many tedious steps necessary to obtain fiber for the richest of fabrics. The action of the steam leaves the silk a yellow color, and it must be whitened again by bleaching.



Tons of hemp come from the Philippines each year, to be twisted into rope or woven into coarse matting, the crudest of fabrics made by the weaver. Above we see the rough fiber drying in the hot Philippine sun before being packed for export.

Linen fabrics are made of fiber from the stems of the flax plant. There are cambric and lawn linens, expensive table-cloths of linen, and coarser weaves such as huckaback toweling (*see* Linen).

Calicoes and Other Cotton Goods

"Calico" takes its name from Calicut, a seaport on the Malabar coast of India. The name was first given to white cotton cloth, but now includes colored cotton cloths that are not sufficiently fine to be classed as "muslins" (named from Mosul, Syria). Calico printing, by which the cloth is given any desired pattern, was at first done by means of wooden blocks pressed upon the cloth by hand. Now great printing presses print rolls of calico cloth much as the colored supplements of newspapers are printed. This printing process may also be applied to woollen, worsted, silk, and linen fabrics. Other common cotton cloths are gingham, duck, canvas, percale, batiste, organdie, voile, longcloth, and ratiné. Many waterproof fabrics

use cotton as a base (*see* Linoleum and Oilcloth).

Knitted goods are made of the same kinds of fibers as the woven fabrics, but are much more elastic. However, they ravel more easily, since they are made by looping a single thread (as in hand knitting) instead of interweaving warp and woof (*see* Knitting Machines). Knitting was used first for stockings and underwear. Jersey cloth, made with an elastic stitch like knitting, is made in wool and in silk.

In recent years, the textile industry has greatly increased its use of artificial fibers. By far the most important of these is rayon. Synthetic fibers which have some of the qualities of wool have also gained some commercial importance.

Cloth making has had in the past an important effect upon history. Many medieval towns owed their prosperity to the secrets of their cloth-makers' guilds, and many a distant land was first visited by traders in search of rare weaves. (*See* Clothing.)

THACKERAY, Great REALIST and Satirical HUMORIST

THACKERAY, WILLIAM MAKEPEACE (1811-1863).

In the opinion of more than one critic, this English novelist and satirical humorist is the most thoroughly representative man of letters of his age. His collected works fill 26 volumes and are in many modes—prose, verse, romance, parody, burlesque, essay, biography, criticism—yet there is not one, as Frederic Harrison says, which can be put aside as worthless and an utter failure. He was an English gentleman, who wrote the language of an English gentleman of his day. And, as a man who was once his enemy said, his knowledge of the human heart was greater than that of any other except perhaps Balzac and Shakespeare.

Thackeray's Life in Brief

Thackeray was born July 13, 1811, at Calcutta, India, the only child of Richmond and Anne Becher Thackeray. His father, who was in the employ of the East India Company, died four years later and at six years of age the boy was sent home to England for his education. After six years at the famous Charterhouse, he entered Trinity College, Cambridge, which he left after a year and a half without a degree. During 1830 and 1831 he spent a year abroad. Returning to London he began to study law but soon turned to art and went to Paris (1834) to pursue his studies. In 1836 he established with his step-father, Major Carmichael Smyth, a short-lived newspaper for which he became Paris correspondent. At Paris, Aug. 20, 1836, he was married to Isabella Shawe. Their children were Anne Isabella (1838), later Mrs. Ritchie; a daughter who died; and (1840) Harriet Marion, who married Leslie Stephen. Soon after his marriage Thackeray decided upon the profession of letters, which he followed in London the rest of his life. In 1860 he became the first editor of the *Cornhill Magazine*, in which 'Dennis Duval' was appearing at his death. He died Dec. 24, 1863.

The Calamity that Started Him on His Career

The turning-point in Thackeray's life was the calamity which befell him when he was not yet 29 years of age. The birth (1840) of his daughter, Harriet Marion, affected his wife's mind, and, despite his untiring efforts for months, she did not wholly recover. At length, forced sadly to recognize that she would be better off without him, Thackeray placed her in a

friendly home. Thenceforth, his chief object was to maintain her in comfort, to protect his two little girls, and to leave them a competence. Already he had adopted letters for his profession and had written a few brilliant but fugitive tales and sketches for magazines.

Now in his unhappiness he produced 'The Great Hoggarty Diamond', earning a measure of fame which had been denied to his periodical writing. This success inspired a reprint, under the title of 'Comic Tales and Sketches', of previously published stories, including 'The Yellowplush Papers'. Soon he was invited to write for *Punch*. With Shirley Brooks and John Leech, he raised the magazine to first rank and helped maintain it there for more than ten years by his illustrations as well as by his articles.

Though in the course of his life he contributed to 27 periodicals, to *Punch* he gave his best criticism, satire, parody, versifying, caricature, political comment, drawing—all that constituted him the star contributor. And though this ephemeral expression, peculiarly Thackerayan in sweeping variety, was to a degree satisfying, the author felt he was not advancing as, say, Charles Dickens was advancing, with 'Pickwick' and other novels trumpeting success. To be sure, through this multitude of pot-boiling features, he was developing his genius and gradually approaching his destined climax, but at a cost—at a terrific cost, for he died an incredibly exhausted old man at 52, his six feet four shrunken, his magnificent brain weary from incessant toil.

Start of His Literary Career

At the beginning of his career he had to overcome a constitutional laziness to exert fully his powers in one direction. He prodded himself toward concentration. A visit to Ireland (1842), he celebrated with the 'Irish Sketch Book'; a tour to the Mediterranean (1844), with 'Notes of a Journey from Cornhill to

Grand Cairo'. A novel completed on the latter tour did more to advance him than did the 'Notes'. This novel was 'Barry Lyndon: A Romance of the Last Century', the story of a criminal that only Fielding or Thackeray could have written. In continuity and cumulative wealth of detail it is superior to either of his two masterpieces, 'Vanity Fair' and 'Henry Esmond', and as a whole it is only slightly below them. With Anthony Trollope, one must agree that in no display of mental force did he rise above 'Barry Lyndon'. And in 'Barry Lyndon' he had reached maturity of style.

Now, at the age of 35, Thackeray was still unknown beyond his friends and the small literary circle that had lifted the mask of his various pen names. For, following the fashion of the times, he had published all his earlier pieces under such fanciful names as "Yellowplush," "Fitz-Boodle," "Jeames," and "Mr. Snob." Most suggestive of these pen names was his favorite "Michael Angelo Titmarsh," for Thackeray's nose had been broken by a schoolmate just as Michelangelo's had been broken more than three centuries before.

Moreover, his works were not popular: his attacks upon mankind's faults and foibles did not inspire popular liking; nor did intelligence, his predominant characteristic, draw a wide audience. Yet he was about to conquer the public on his own grounds.

'Vanity Fair' Brings Fame

In January 1847 appeared the yellow cover of the first number of 'Vanity Fair', published as a serial in monthly instalments. Month by month its readers increased and when the final twentieth came out, Becky Sharp was on everybody's tongue. Through 'Vanity Fair', Thackeray began to share honors with Dickens. Though never attracting so many readers as Dickens, he was lionized, patronized, entertained. He loved it all, from drawing-room to dining-room. Society became his ally in writing, since from this society he now drew some of his types. It also became his personal ally, making him gentler, more kindly humorous.

Except for *Punch*, he withdrew from periodicals and went on with the novels. The series, so well begun with 'Barry Lyndon' and 'Vanity Fair', continued through 'Pendennis', publication of which (1848) was interrupted by illness; 'Henry Esmond', "a book," says Lewis Melville, "to be ranked among the greatest works of historical fiction of any age or country"; 'The Newcomes' and 'The Virginians'. These six are top-most, but others are still read by lovers of Thackeray's gifts and expression.

Before 'The Virginians' appeared, the author welcomed an invitation to lecture; he wished to earn

money for his daughters, and did earn it, leaving them an income better than the one he had inherited and lost early in his career. After a successful series of lectures on the English humorists, he followed his triumph up two years later, less successfully in England, by a series on the four Georges. The lecturer

visited America six months for each series (1852-1853 and 1855-1856), where he created a fine impression and endeared himself as Dickens had not done.

His Love for the Eighteenth Century

Both sets of lectures dealt with the 18th century, which Thackeray especially loved. This love is one source, perhaps the chief source, of his literary achievement. It manifests itself most notably in 'Henry Esmond', which inimitably conveys the feel and atmosphere of Queen Anne's reign and later. In truth, from the point of time, Thackeray looked not forward but backward. Admiration for Fielding, greatest of 18th-century novelists, partly inspired 'Catherine' and 'Barry Lyndon'. It particularly inspired 'Pendennis', which attempts to describe a natural man,

weak, selfish, untrustworthy, much as 'Tom Jones' describes a factual, non-heroic man of Fielding's day.

Thackeray as a Realist

Inclination toward the real, encouraged by the example of Fielding, prompted Thackeray's reaction against novels exploiting conventional heroes and heroines, or heroic figures, or sentimental men and women. In 'Catherine', a story of jailbirds, he protested against rose-water novelists, who wrote of impossible heroes; here was his earliest definite expression of belief that lives of rogues should be described, as well as other lives. Because the heroic seemed untrue, he could not paint heroic characters; reaction against Scott produced 'Rebecca and Rowena', the finest burlesque in the language, a burlesque having the merit that it can be read without in the least detracting from pleasure in 'Ivanhoe', of which it purports to be a continuation. Thackeray was not for the sentimental, not for the heroic, but for the real. To his disgust for the maudlin, the foppish, the vulgar, is attributable much of his satire.

His realism lacked sordidness and was, in balance and harmony, singularly effective. In 'Catherine', antipathy for the vicious joins sympathy for the murderess. If, in 'Pendennis', Blanche is a young woman of shams, Laura is a young woman of honest nature, whose love for Arthur never wavers. So fascinated the author became in Barry's fortunes as to create a half-admiring reader; and more than one non-admiring reader erred in suspecting that Barry's specious logic

WILLIAM MAKEPEACE THACKERAY



Thackeray was a giant in physique as he was in spirit. He stood six feet four, and had a head so massive that in boyhood he took a man-sized hat. But he had "a little dab of a nose," and he was near-sighted.

was meant to argue not against him but for him. So subtly, so surely, Thackeray created Beatrix, that he was unable to show, or did not show, precisely what she was until her final step with the Pretender. He likes, and the reader likes, Pendennis. In all these instances Thackeray's art created as life itself creates.

Because he was a realist he relied upon real men and women. Colonel Newcome, for instance, has his origin in Thackeray's stepfather, Major Carmichael Smyth; Dobbin, in his Trinity friend, John Allen; yet the created figures are as different from the originals as Pendennis is different from Thackeray himself. In the historical characters, of course, such as Dick Steele and Lord Mohun, the author was at pains to create true portraits with all the virtuosity of which he was capable. As realist he also used scenes and incidents out of observation and experience. Exeter is Chatteris; in the earlier books, Charterhouse is Slaughterhouse, in the later ones, Grey Friars. Rawdon Crawley, Pendennis, Colonel Newcome, and Philip—conveniently for Thackeray—all spent their boyhood at his old school. So Pendennis goes to Cambridge, perfectly remembered and described by Thackeray after 20 years.

Satire Balanced by Sentiment

Realism and satire walk hand in hand throughout the works of Thackeray. While at Trinity College, he wrote for the *Snob*; even at the Charterhouse he displayed in his drawings, verses, and parodies a sense of the ridiculous not infrequently associated with contempt. Had he finally chosen drawing for his preferred medium, he would have belonged to the Hogarth school. At a suspicion of snobbism or vulgarity in life or of false sentiment in literature, he was ready to castigate. Not only 'The Book of Snobs' but most of his later works lash snobbism and hypocrisy. 'Vanity Fair' satirizes the social world; 'The Newcomes' is almost wholly satirical, its object being to show how men easily deceive and easily are deceived. See how through Mr. Honeyman Thackeray derides a type, of clergyman; how in Barnes Newcome he hits off the acute, unscrupulous businessman; how in Clive Newcome he condemns young men at once idle and ambitious. He knew in himself the juxtaposition of these qualities, but his ambition was too unselfish for surrender to idleness. His hatred of the false, his sardonic twist of mind, the fits, from one of which he presumably died (he died in his sleep), and the melancholy outlook aggravated by his wife's incurable mania—all strengthened the satiric proclivities of his humor.

Yet he balances his satire no less than his realism. In all literature are no more happy, tender, or pathetic passages than may be found in 'Vanity Fair', 'Henry Esmond', or 'The Newcomes'. Amelia prays for George, dead on the battlefield of Waterloo, with a bullet through his heart; Lady Castlewood meeting Esmond at church, after long years, addresses him in one of the simplest, sublimest speeches woman has ever spoken; Colonel Newcome answers "Adsum!" as he had answered at school, and dies the most touching death

in 19th-century fiction. If his satire seems to flourish at the expense of making his good people fools, and his clever people rascals, he might reply that he had looked about the world and had seen honest men fail where dishonest men succeeded. If he never felt consciously the desire to follow his preacher ancestors, he followed them unconsciously in denouncing wickedness, rather than sweetly praising righteousness.

Plots Carelessly Constructed

In his plots, Thackeray was desultory—too much so for the modern reader. Except in 'Esmond', he never made a plot. His characters led him; sometimes they led him too far astray for best results; their creator should have controlled them. He praises 'Tom Jones' for its by-play of wisdom, one feature of its exquisite construction. His own by-play, however wise and witty, follows from that regrettable habit of indolence, from a magnitude of mind and creative prolificness that balked at laborious ordering and hedging of material. Indolence and luxury, he confessed, were his dragons. Only one of his books has no single slip of idleness; that book is 'Esmond'. His purpose, not always sure, is sure in 'Esmond', intended to be his masterpiece; and it is his masterpiece, though he finally settled upon 'Vanity Fair' as his own favorite. 'Esmond' is a unit, a well-turned narrative. If, in words Trollope liked to repeat, Thackeray dropped pearls in speaking and writing, these pearls, unset, unstrung, were not best displayed for his reader. The habit of dropping pearls symbolizes his greatness; he was careless of wisdom and wasted it: all great men carelessly waste wisdom.

Realist, satiric humorist, Thackeray was not a cynic, if the cynic is the idealist grown old; but with Ecclesiastes he believed that all is vanity. He hated meanness; he loved loyalty and courage. Tender to women and children, he began 'The Rose and the Ring' to amuse a sick girl; he adopted another, for whom he provided. He was not a good editor, sympathizing too keenly with would-be contributors whose work was poor, and giving them money from his own purse. In Lord Houghton's words at his death, he was never wroth except with wrong, a censor without Fielding's dross, with a spirit larger than that of Scott.

Books By and About Thackeray

Most of Thackeray's works were published serially before they appeared in book form. The following list, in which most of the titles are abbreviated, arranges his chief works in roughly chronological order: 'Catherine', 'Barry Lyndon', 'The Book of Snobs', 'Vanity Fair', 'The Great Hoggarty Diamond', 'Pendennis', 'Rebecca and Rowena', 'The Kickbursys on the Rhine', 'Henry Esmond', 'The English Humourists', 'The Newcomes', 'The Rose and the Ring', 'The Virginians', 'The Four Georges', 'The Adventures of Philip', 'Roundabout Papers'.

For books about Thackeray, see 'The Life of W. M. Thackeray', by H. C. Merivale and E. T. Marzials; 'The Life of William Makepeace Thackeray', by Lewis Melville, in two volumes. See, also, Anthony Trollope's biography of Thackeray, in the 'English Men of Letters' series; Miss Mitford's 'Recollections'; Hannay's brief 'Memoir'; Leslie Stephen's article on Thackeray in the 'Dictionary of National Biography'; Frederic Harrison's 'Thackeray's Place in Literature'; George Saintsbury's 'Consideration of Thackeray'.

The LAND That Is Named for FREEDOM

Extent, Area, Population.—North to south, about 983 miles (600 miles in southern peninsula); east to west, about 310 miles. Area, about 200,000 square miles (excluding area ceded by French Indo-China in 1941). Population, about 14,465,000.

Climate.—Monsoon type. Annual precipitation in south, about 50 inches; in north, about 42 inches. Temperature, wet season, 65° to 85° F.; dry season, 100° F.; extreme (April).

Cities.—Bangkok (capital, about 885,000). No other cities or large towns.

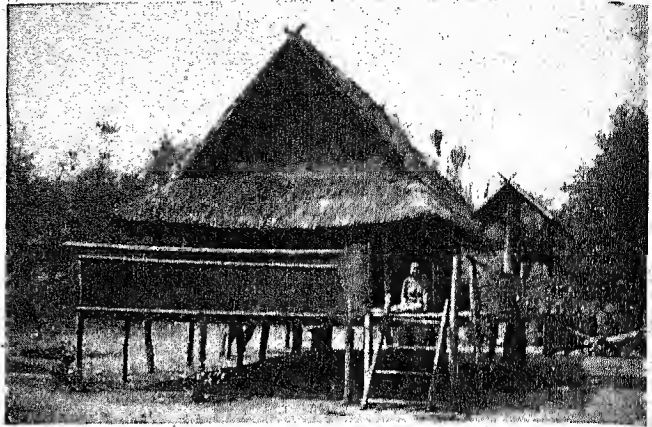
THAILAND (*tī'lānd*). The old kingdom of Siam in 1939 adopted a new name, *Muang Thai*, or Thailand. This was a significant change, for the new name means "land of the free," and it points to an important fact. Of all the countries in southeastern Asia, Thailand alone, and its dominant people, the Thais, had escaped rule by the empire-building whites.

The Thais probably came from China during the time of Europe's Dark Ages, and established themselves in northern Siam. Then they gradually extended their rule southward to the sea. In this they were helped by the mountain barriers that protect the country.

On the west, a long mountain range separates Thailand from Burma, then runs down the Kra Isthmus—the northern half of the Malay Peninsula. In the main part of the country two broad valleys lie east of this range, with low mountains between. The western valley, drained by the Menam River, is about 60 miles wide. The eastern valley slopes from a curved western rim down to the Mekong River. The whole has an area about equal to that of the Atlantic states from North Carolina through Florida. It lies in about the same latitude as Central America.

Climate, Crops, and Minerals

The valleys are kept fertile by the monsoon climate. Monsoon rains give a wet season from May to October, and dry weather otherwise, with one exception. On



This native home is roofed with thatch, and has open sides for ventilation during the steaming-hot wet season. It stands on pilings, to keep the interior dry when heavy rains set the ground awash.

the east coast of the Kra Isthmus, the seasons are reversed. Inland, the climate is steaming hot in the wet season, but 20 degrees or so cooler in winter. Night temperatures may fall 30 degrees.

The high western range takes much of the rain, and so the large valleys receive only about 50 inches a year. But thunderstorms in the dry season keep the rain steady enough in the south to support a forest. In the mountainous north, the rainfall diminishes sharply; rivers may even lack water in the dry season, and boats are stranded until the next rains.

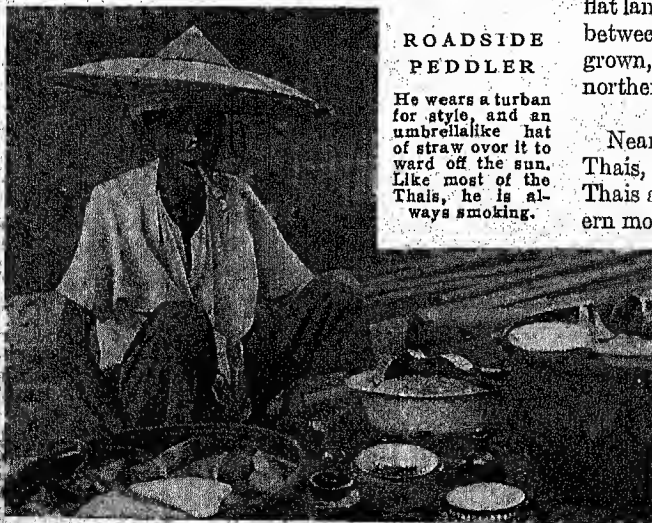
Throughout the hot forest region, Thailand has the typical Indo-Chinese plants and animals, such as mangroves on the coast, palms, the tiger, the rhinoceros, and the elephant. White (albino) elephants, which are occasionally found, are considered sacred. In the cooler, drier north, the growth runs to teak, bamboo, grass, and scrub. The Kra Isthmus in the south is tropical enough for rubber growing. Here too is most of Thailand's mineral wealth, largely tin, which is found in stream gravel.

The central valleys are suitable for rice, and the flat land makes irrigation easy. On intermediate levels between these valleys and the high mountains, tea is grown, and hillsides are terraced for rice. The cooler northern valleys grow beans, peas, and corn.

The People and Their Lives

Nearly nine-tenths of the people are short, stocky Thais, with slightly slanted eyes. Included among the Thais are the tattooed Laos of the northern and eastern mountain regions. Some half million Malays live in the south. The Chinese inhabitants are variously estimated at from half a million to a million.

More than four-fifths of the people live in farming villages, usually along a river. Only about a tenth of the total land area is cultivated; and of this about 90 per cent is in rice. Each village has a *vat*, or Buddhist temple. Houses are set up on piles, with a huge thatched or tiled roof and walls of mats or slats. Formerly both men and women wore a



ROADSIDE PEDDLER

He wears a turban for style, and an umbrellalike hat of straw over it to ward off the sun. Like most of the Thais, he is always smoking.

bloomerlike *panung*, with a shirt. Today women are turning to the *pasin* of shirt and skirt. The principal foods are rice and fish, with some fruits and vegetables. Pigs and chickens are raised for sale to the Chinese, as the Buddhist Thais dislike killing animals.

Thais do little handiwork except metalworking, notably silver hats, and some spinning and weaving. But nearly everyone plays a musical instrument, and likes to improvise poetry. They are devoted to dancing, shadow plays, and festivals, but in recent years the motion picture has been the favorite amusement.

The liberty-loving Thais will leave the land for office employment or government service, but until recently they scorned to work in trade or industry. Hence most of the Thai business fell into the hands of Chinese or whites. The chief industries are rice milling, teak lumbering, and tin mining. Deposits of tungsten ore, zinc, antimony, gold, iron ore, and coal are little developed. Minerals and the forests, which cover nearly three-fourths of the land, are worked under state concessions. The government operates some industries, such as milling sugar and making paper.

Thailand grows about 3 per cent of the world's rice. Since tropical diseases keep the population down, there is a large surplus of rice for export. Other exports are tin, teak, gold, and rubber. The principal imports are cotton goods, foodstuffs, and petroleum products.

Most of the industry and commerce are centered in the capital, Bangkok (see Bangkok). A fine state-owned railway system of some 2,000 miles fans out from Bangkok to principal trade centers and down the Kra Isthmus. Otherwise, rivers and canals carry most of the local traffic, except where air lines operate.

Education has been compulsory since 1921, and is slowly decreasing the high illiteracy. Most rural schools are still in monasteries but are state controlled. Vocational training is emphasized everywhere to prepare Thais for trade and industry. At Bangkok is Chulalongkorn University, founded in 1917.

Until war struck in 1941, the government, aided by the Red Cross, the Rockefeller Foundation, and missionaries, was extending rural clinics to combat malaria and other tropical diseases. Vaccination was compulsory.

A Troubled History

The early Thais made their first definite mark in history in 1238, when they seized a northern portion of the old Khmer or Cambodian kingdom. Thereafter they gradually extended their holdings, until they dominated the Indo-Chinese peninsula, as the kingdom of Siam. Since Siam was not an important source of trade, European nations did not interfere with it until the British began conquering Burma in 1824, and the French began encroachments in Cochin-China in 1862. Thereafter each neighbor periodically lopped off portions of the land, until Britain and France agreed in 1896 to keep Siam between them as an independent buffer state. In 1907 Siam exchanged some territories with France, and in 1909 ceded to Britain its sovereignty over northern Malay states, in return for British abandonment of special privileges.

Siam entered the World War of 1914-1918 on the Allied side, and thereafter a spirit of nationalism and desire for progress asserted itself. On June 24, 1932, a peaceful revolution replaced absolute royal rule with a limited monarchy; a legislature, and universal suffrage. King Prajadhipok abdicated in 1935 in favor of his nephew, the then nine-year-old Ananda Mahidol.

When France was defeated by Germany in 1940, Thailand seized its chance to regain territory from French Indo-China. A short war was ended Jan. 31, 1941, when Japan,

acting as mediator, awarded Thailand an area estimated at about 25,000 square miles. When Japan entered the war in 1941, Thailand surrendered after a few hours of resistance and became a base for Japanese operations. (For later events, see World War, Second.)

THE FAITH OF BUDDHA DOMINATES BANGKOK



From everywhere along the waterfront of the capital city, the faithful see the porcelain pagoda Vat Arun, often called Vat Chang.

TEACHING RELIGION WITH STATUES



As worshipers enter this temple in Bangkok, they pass statues of figures from the ancient epic of the 'Ramayana'. The huge demons at the left are of brick covered with glazed tile.

THAMES (tēmz) RIVER. The largest river of England, the Thames is also the most important, having as large a traffic, probably, as any river in the world. It rises in the Cotswold Hills in southwestern England, and flows in an easterly direction to the North Sea. It is about 210 miles long, and as far as London, 47 miles from its mouth, is navigable for large vessels. It is 18 miles wide at the mouth, and the tide flows up for 72 miles. Its bridges and tunnels at London, its great docks and embankments, are a part of the sights of the city. Canals connect the Thames with the Avon and the Severn, with the Sussex coast, and with the canal system of central England. From London to Oxford it is much used by rowboats, launches, and houseboats, and on any Saturday, Sunday or holiday in summer, it is sure to present a gay and festive scene. The Thames has played an important part in the history of the islands since before the invasion of Julius Caesar.

THANKSGIVING. With Indians as guests of honor, about tables loaded with game and fish, wild fruits from the forest, and corn-bread and vegetables from their new gardens, the Pilgrim Fathers celebrated their first American harvest festival, in October 1621, the first autumn of the exiles in their new home.

A quaint old account thus describes the occasion: "Our harvest being gotten in, our Governour sent foure men on fowling, so that we might after a more special manner rejoyce together after we had gathered the fruit of our labours. They foure in one day killed as much fowle as, with a little help beside, served the Company almost a weeke." Many of the Indians, among them Chief Massasoit, the Pilgrims' friend and ally, joined in the three days' feasting. There was plenty of roast turkey, for the fowlers found "great store" of the now famous Thanksgiving bird in the neighborhood of Plymouth. But in this old account there is no record to show that this was a day set apart for giving thanks.

The year following the harvest festival was filled with misfortune and the colonists had held no autumn feast. With empty larders they were counting the days until the spring-sown crops should furnish them with supplies. Then a terrible drouth withered the corn in the fields and burned the gardens brown. A day of special prayer was followed by a long refreshing rain, and at the same time a ship loaded with friends and supplies was sighted. So the governor appointed a day for "public thanksgiving." But this also was different from the present Thanksgiving Day, for we find no account that tells of feasting following the long church service.

Although we read of feasts, of fasts, and of "thanksgiving days" being observed during each year, it is not until ten years later (1636) that we find record of a celebration such as we now keep. Then we read that the colonists of Scituate, in Plymouth Colony, gathered "in the meetinghouse beginning some halfe an hour before nine and continued untill after twelve a'clock," with psalm-singing, prayer, and sermon.

Then came "makeing merry to the creatures, the poorer sort beeing invited of the richer."

In the course of the Revolutionary War, the Continental Congress appointed Dec. 18, 1777, to be observed generally as a "thanksgiving day" in consequence of the surrender of Burgoyne. In the first year of his office, President Washington issued a proclamation recommending that Nov. 26, 1789, be kept as a day of "national thanksgiving" for the establishment of a form of government that made for safety and happiness.

For years the festival was almost exclusively a New England institution, celebrated by religious services in the churches, the sermon being often a political address, and by the gathering at the old home of the scattered members of the family. The day gradually became a custom in the Western and some of the Southern states, each appointing its own day. In 1864 President Lincoln issued a proclamation in which he "appointed and set aside" the last Thursday in November as a day of national thanksgiving "for the defense against unfriendly designs without and signal victories over the enemy who is of our own household."

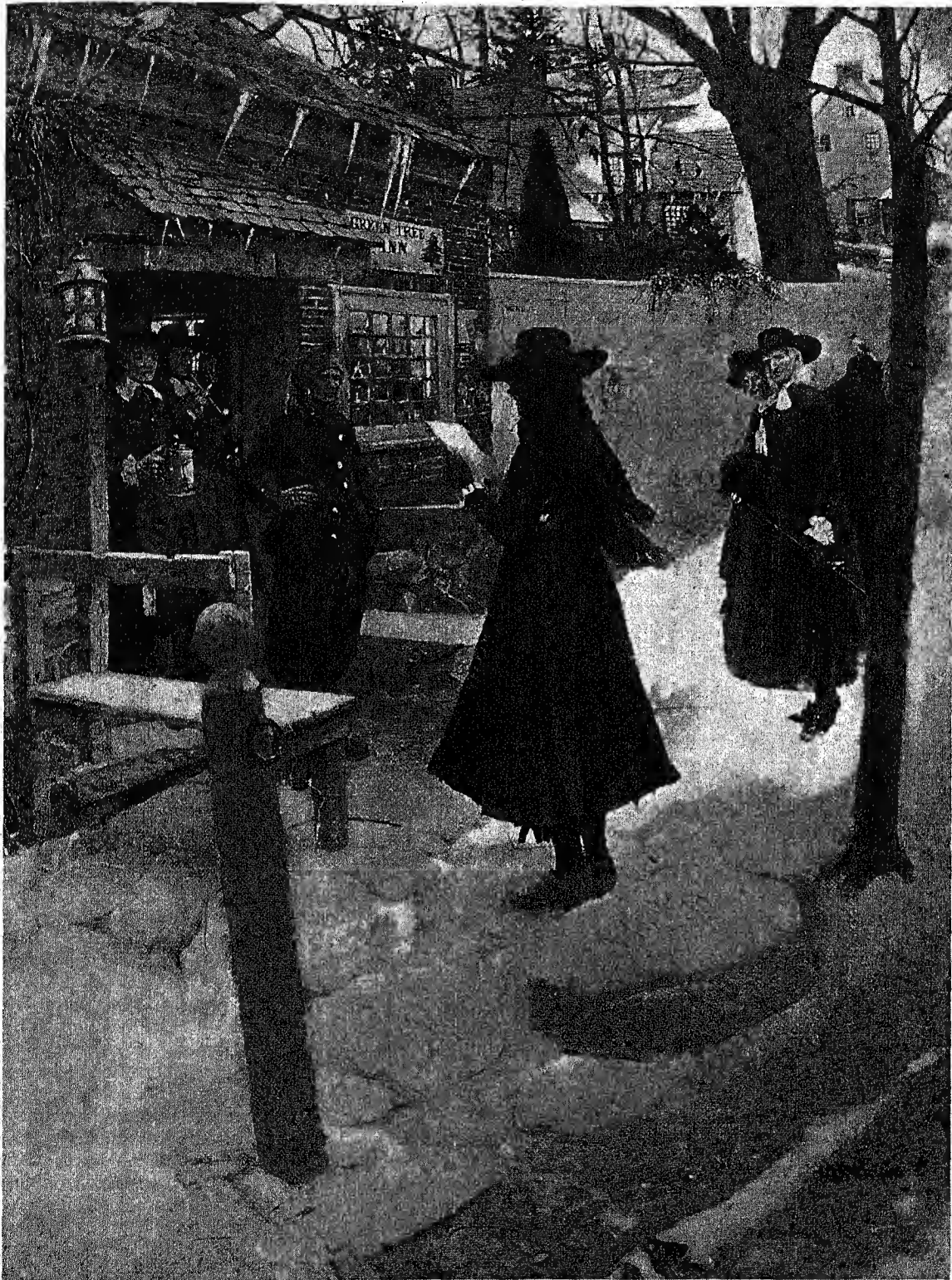
Until 1939, each president followed Lincoln's example in proclaiming the last Thursday of November a national day of thanksgiving. In that year Franklin D. Roosevelt, desiring to lengthen the interval between Thanksgiving and Christmas, named the next to the last Thursday as the date of celebration. But in December 1941 Congress passed a resolution making the fourth Thursday a legal holiday. Governors in the various states usually issue proclamations to this effect. The day is also celebrated in all the territories and possessions.

Although Thanksgiving Day is wholly an American institution, harvest festivals have been known since time immemorial. It was long customary in England and elsewhere to hold special days of "fasting and prayer" in times of peril and disaster and equally to celebrate with "thanksgiving" and feasting Nature's annual bounty and other marks of God's favor.

THEATER. In the shadow of the Acropolis, the citadel of Athens, are the ruins of the great theater of Dionysus, in which were presented the plays of the "Golden Age" of Greece. (See Drama.) As these great dramas remain for us one of the loftiest expressions of human genius, so the nobly proportioned Greek theater is one of the most impressive memorials of ancient architecture.

The seats of the Athenian theater, which was completed about 340 B.C., were built into the side of a hill. Thus all the spectators on the rising slope had a clear view of the "orchestra," the circle where, in the beginning, Dionysus was worshiped with choric dances. Cutting across the rear third of the orchestra was a platform about ten feet high, which in time became the stage. Across the rear of the stage extended the decorated front of the stage buildings, which took the place of a back drop and provided dressing rooms behind it for the actors.

A THANKSGIVING DAY PROCLAMATION IN THE 17TH CENTURY



This scene in a New England town of the 17th century shows us the town crier reading the governor's Thanksgiving Day proclamation before an inn, while patrons and passers-by listen attentively. The painting is by Stanley Arthurs, who is well known for his faithful re-creation of American historical scenes. From the time of the gathering of the first harvest at Plymouth in 1621, it was common for the colonial authorities to appoint a day of thanksgiving to God in the fall when the harvests were in. But there was no uniform observance of this annual festival until 1864, when President Lincoln proclaimed a national holiday.

It is interesting to note that the words used by the Greeks for the principal divisions of the theater are the same words that we use in English, slightly modified through the centuries. "Orchestra" is the Greek word meaning "dancing place," and is still used to designate the part of the theater immediately in front of the stage. The word "scenery" comes from the Greek word *skene*, used to designate the stage buildings, which served the Greeks as scenery. "Proscenium," applied to the part of the modern stage in front of the curtain, is identical with the Greek word *proskēnion*, which designated the stage-front.

The theaters of the Greeks were all roofless and the performances were given by daylight, hence there was no need for artificial lighting. Changes of scene were very rare and only the most rudimentary stage machinery was employed, such as a "thunder-machine" and a crane for suspending in mid-air the actors who represented gods. In order that the voices of the actors might be heard in all parts of the vast theater, they wore masks equipped with a sort of megaphone. In tragedy those who represented the great legendary characters wore in addition a shoe or "buskin" with stiltlike soles to increase their height.

The theaters of the Romans were copied from the Greek structures, with certain variations and improvements. By the use of supporting arches they were able to build great sloping theaters, instead of using hillsides as the Greeks did. Since the chorus disappeared from most of their plays, the orchestra was no longer needed for the performance, and senators and other persons of note were seated here. At the same time the stage was lowered and enlarged, so as to accommodate more players. Decorations were often very lavish. Gold, marbles, fine textiles, and a system of cooling the interior of the building by means of aqueducts made the Roman theater a luxurious place of recreation.

Vast Theaters of Olden Times

For special performances temporary theaters were often built on an astonishingly extravagant scale. One such theater is said to have held 80,000 people, and to have had 360 pillars and 3,000 statues. The chariot races, gladiatorial fights, and combats with wild animals took place in such structures as the Circus Maximus of Rome, and the amphitheaters (like the Colosseum at Rome) which sprang up all over the Roman Empire.

All the grandeur of Roman theaters and amphitheaters was destined to be buried and forgotten for hundreds of years. As dramatic art grew more corrupt and debased and the circus grew more brutal, the power of the rising church was exerted against it, until finally all theatrical and kindred performances were forbidden. In the course of the Middle Ages the arenas and the amphitheaters scattered throughout the Roman world were filled with buildings used for shops and houses.

During the Middle Ages there were no theaters in the proper sense. Open-air performances were given

in churchyards, in booths, or in two-storied wagons called pageants. Jugglers and mountebanks performed in the public squares and after some time strolling bands of players gave performances in courts of inns and taverns. The common people stood during the performances, but the wealthier patrons looked down from their windows and balconies.

Great Dramas in Crude Theaters

The theaters of Shakespeare's time were built in imitation of the inn-court. They were eight-sided, for the most part, with a raised stage built across one of the sides, and extending into the body of the house. Favored spectators sat on its edge or in the three-storied covered balconies that extended all the way around the building, even behind the stage. The "groundlings," as Shakespeare called the people in the "pit," stood during the performance and were unprotected from the weather. Flags were flown above the buildings as a sign that a play was on.

At the back of the stage were dressing-rooms and a curtained recess used for such scenes as the play within the play in 'Hamlet' and Desdemona's chamber in 'Othello'. The performance was always given by day, so that there was no lighting. Scenery was very simple and there was no curtain.

The public theaters during the reigns of Queen Elizabeth and James I were not patronized by women. If the court wished to see a performance, the company was "commanded" to appear in a palace hall. The form of entertainment which the higher classes preferred was the masque, which resembled the pageant of our day. These masques were given in the great halls of colleges, palaces, and other large buildings. Candles were used for lighting, seats were placed on the floor, and the balconies, if there were any, were used for guests of honor. After a while theaters were built expressly for these masques. The first one was that of the Blackfriars, where the choir boys of St. Paul's gave performances. Painted scenery was used and the entire production became very elaborate, thus foreshadowing the opera. The modern English playhouse is a direct descendant of this Blackfriars Theater, with the addition of features brought in by way of France and Italy.

The tendency throughout the 17th and 18th centuries was toward extreme elaboration. In Italy opera-houses grew more and more luxurious in scenic effects. In the 19th century such famous opera-houses as La Scala at Milan and San Carlo at Naples were built on a still greater scale. France, Germany, England, and America followed the example. Scenery and stage apparatus were enormously improved, until we get such amazingly equipped theaters as the famous Royal Opera House, Covent Garden, of London. This stage is divided into six sections which may be lifted or lowered by electrical power. Overhead is a bewildering maze of pulleys, cables, and wires controlling scenery and lighting. In some places there are revolving stages so that one-half may be used while the other half is being set.

Through the latter half of the 19th century the tendency persisted to make performances more and more spectacular; settings and costumes became still more complex and gorgeous and elaborate. A counter-tendency set in during the last decade of the century in the direction of simplification and the substitution of symbols for elaborate realistic imitations. Gordon Craig in England, Max Reinhardt in Germany, Leon Bakst in Russia, and the leaders of the Irish theater movement accomplished amazing results by the use

Thebes lies in the central part of Boeotia in eastern Greece, a region of fertile and well-watered soil but heavy fog-laden atmosphere. The Boeotians were said by their Athenian neighbors to be as dull as their native air and their stupidity passed into a proverb. Nevertheless they produced such writers as the poet Pindar and the biographer Plutarch, and many warriors who achieved glory in battle.

Her historic past—about which grew up a group of legends scarcely less interesting than the Trojan cycle

HOW THE THEBANS BROKE THE POWER OF SPARTA



At the battle of Leuctra, in 371 B.C., the Theban leader Epaminondas devised a military maneuver which routed the dreaded Spartan phalanx. The Spartans as usual drew up their forces in three masses, with the strongest on the right. To oppose the right Epaminondas consolidated the bulk of his army, 50 shields deep, while his weaker center and right he withdrew slightly, so that they would not come into contact with the Spartans until after his powerful left had crushed the Spartan right. The plan worked out exactly as he had planned. The Spartans were routed, more than half of their number were slain, and the power of the Spartan state was broken forever.

of the simplest decorations and settings, relying chiefly for their effects on the skilful use of lighting. The work of these men has been felt in the United States in the various "Little Theaters" scattered through the country, which have followed in the steps of the pioneers of their new stage art.

THEBES (*thēbz*), GREECE. An insignificant little country town of about 5,000 inhabitants, 44 miles northwest of Athens, stands today on the spot which was once the seat of one of the oldest and greatest powers of Greece, the "seven-gated city of Thebes." Only a few ruins are to be seen today on the Cadmea, the acropolis of ancient Thebes, so called after Cadmus, the mythical founder of the city (*see* Cadmus).

—her central location, and her strong fortifications made Thebes chief among the cities of Boeotia. As such she frequently came in conflict with Athens, and when rivalry between Athens and Sparta finally culminated in the Peloponnesian War (431–404 B.C.), Thebes sided with Sparta. After the war was ended, however, Thebes became Sparta's bitter foe, because of the arbitrary and tyrannical policies of her former ally. After numerous conflicts, the Thebans expelled the garrison which the Spartans had by treachery put in possession of the Cadmea, killed the leaders of the pro-Spartan party, and formed a combination of Greek states against Sparta. The Spartans met military reverses, and soon signed a peace with all

their foes except Thebes, which was left unaided to bear the onslaught of the dreaded Spartan phalanx. This tactical device consisted in drawing the heavy-armed infantry up in a solid mass eight or twelve men deep, so that the onrush flowed unbroken through the hostile lines, like a mass play in the modern game of football.

But the Theban commander Epaminondas—perhaps the noblest and most famous Greek of his day—devised an effective answer to this famous Spartan "play," which he used when he met the foe in 371 B.C. on the plain of Leuctra, about eight miles from Thebes. Epaminondas arrayed his choicest troops on the left, 50 shields deep, directly opposite the right wing of the Spartans, where they had massed as usual their heaviest force, 12 deep. His shallower and weaker center and right wings he kept drawn up so that each line was to the right and rear of the preceding one, and thus held them in reserve while the massive Theban left drove against the Spartan right and crushed it. Then the Theban center and right coming into action completed the rout. Over half the Spartans engaged were slain and Spartan power was ended.

For nine years Thebes held the supremacy of all Greece, but its power was based on the genius of a single man and collapsed with his death at the battle of Mantinea (362 B.C.). Here Epaminondas once more saw his phalanx break the Spartan line, but as he pursued the retreating foe, he was pierced in the breast by a javelin. He was told by his physician that he would die as soon as the weapon was extracted. When news came that the victory was secure, he drew out the javelin with his own hand, saying, "I have lived long enough."

When Philip of Macedon invaded Greece a few years later, Thebes joined forces with Athens, influenced by the eloquence of the orator Demosthenes, and made a brave but unsuccessful stand in the decisive battle of Chaeronea (338 B.C.), bearing the brunt of the attack. At the accession of Alexander the Great to the Macedonian throne, Thebes attempted to recover its liberty, and was leveled to the ground in punishment. Though later rebuilt, it never again was an important city.

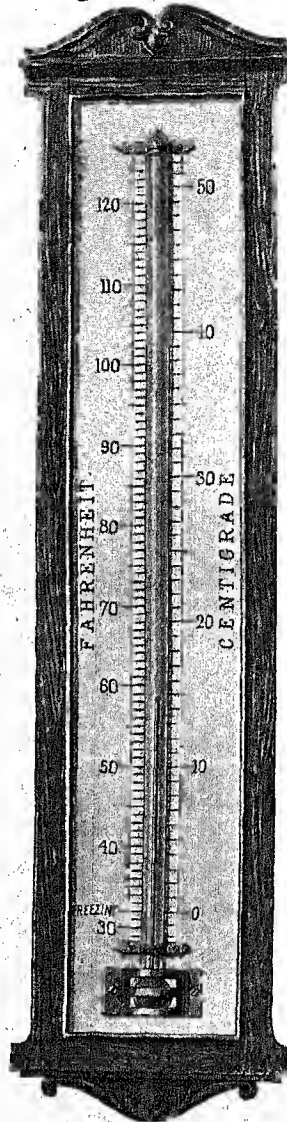
The present town of Thebes is called "Thivai" or "Phiva" in modern Greek. The Greek Thebes must not be confused with the ancient city of Thebes in Egypt, which was for centuries the capital of the Pharaohs (see Egypt).

THERMOMETER. The commonest thermometers are those in which the degree of heat is indicated by the expansion of a liquid. The ordinary household or industrial thermometer consists of a glass tube enlarged at the bottom into a bulb and partly filled with mercury. The bore of the tube is extremely fine (from about a fiftieth to a thousandth of an inch) so that a small amount of expansion or contraction of the mercury in the bulb will produce a relatively large rise or fall of its level in the tube. The thick curved face of the tube then acts as a magnifying glass to make the thin thread of mercury plainly visible. In the making, the mercury is ordinarily driven by heat to the top of the tube which is then sealed off, resulting in a vacuum when the mercury contracts again. For the higher temperatures, however, the tube is filled with gas (nitrogen or carbon dioxide) under high pressure to prevent the mercury from boiling. Alcohol colored red is used in climates or processes where the temperature falls below the freezing point of mercury (38° below zero Fahrenheit).

The Fahrenheit scale, popularly employed in all English-speaking countries, uses as its zero point the temperature of a mixture of ice, salt, and water. The freezing point of water is 32° above zero and the boiling point 212°. In the Reaumur scale, formerly popular in Europe, the freezing point is marked zero and the boiling point 80. The most convenient system, however, and the one used in scientific work the world over, is the Centigrade scale, in which the freezing point is zero and the boiling point 100°.

To change a reading from Centigrade scale to Fahrenheit first multiply by $\frac{9}{5}$ and then add 32. To change Fahrenheit to Centigrade first subtract 32 and then multiply by $\frac{5}{9}$. Thus 20° C. is 20 times $\frac{9}{5}$, plus 32, or 68° F.; and 68° F. is 68 minus 32, times $\frac{5}{9}$, which equals 20° C.

Mercury thermometers for special uses are made with scales up to about 1,000° F. One of the most familiar of the special types is the *clinical thermometer* with which physicians take temperatures. It reads from 93° to 110° F., the normal temperature of the human body being between 98° and 99°. To allow the doctor to read it accurately even after it starts to cool, there is a small constriction in the bore of the tube where the thread of mercury breaks instead of running back. It stays in position until shaken down. One side of the tube is prismatic to magnify the mercury thread for easy reading.



On this house thermometer designed to show changes in temperature of the air indoors, you can readily compare the Fahrenheit and Centigrade scales.

Thermometers that ring alarms, turn off the heat, or start or stop machinery at desired temperatures are made by inserting the ends of electric wires in bulb and stem. As the rising mercury meets the upper wire, it automatically turns on the current. When such a device is used to regulate heat, it is called a *thermostat* (see Heating and Ventilation).

Most solids as well as liquids expand when heated. This gives us another kind of thermometer. If we fasten together a strip of brass and a strip of iron and heat them, the compound bar will bend because brass expands more than iron. The amount of this bending can be indicated on a scale. Recording thermometers or *thermographs* sometimes work on this principle. A pen controlled by the movement of the end of the bar traces a record of the rise and fall of temperature on a disk or drum revolved by clockwork. The bending bar can also be used to open and close an electric circuit at a given temperature. The commonest thermostats employ this principle.

For high temperatures as well as for extremely delicate measurements, expansion thermometers are impractical. Here electric thermometers play a leading part. Heat increases the resistance of certain metals to the passage of an electric current and a device for measuring this changed resistance is a good gauge of temperature. Another type of electric thermometer uses what is called a *thermocouple*, consisting of a loop made of wires or rods of two different metals joined together. When one joint gets hotter than the other an electric current is generated in the loop which is proportional to the difference in temperature (see Electricity). A measure of this current is an extremely accurate indication of the degree of heat in question. When a number of "couples" of metals are connected in series, with one set of joints exposed and the other shielded, the device is called a *thermopile*. The heat coming from a single star has been measured with such an instrument. Electrical thermometers used for high temperatures are classed as *pyrometers* (see Pyrometer).

The earliest attempt to build a thermometer on scientific lines is said to have been made by Galileo. The sealed tube thermometer as we know it today first came into practical use in the 17th century. The word "thermometer" is from the Greek, meaning heat measurer.

THERMOPYLAE (*thēr-mōp'ē-lē*). In this pass leading from northern to central Greece, King Leonidas of Sparta made his famous stand against the mighty army of King Xerxes of Persia in 480 B.C. With 300 Spartans he held the pass until the treacherous Ephialtes, a Thessalian, showed the Persians an unguarded path over the mountains, and allowed them to attack the Spartans in the rear. Here again, in 279 B.C., the Greeks held at bay an army of Gauls until these, too, found a way over the mountains.

Thermopylae means "hot gates" and takes its name from remarkable hot springs near by, which still exist. Besides one large spring used as a bath there are four smaller ones; the water, which is of a bluish green

color and contains lime, salt, carbonic acid, and sulphur, is said to have curative properties in cases of scrofula, sciatica, and rheumatism. The pass, which lies between Mount Oeta and the sea, is not so narrow as in ancient times, for the wash of rains and nearby streams has built up the seaward side into a broad plain. A mound with some remains of the ancient monuments may still be seen. (See Persian Wars.)

THESEUS (*thē'sūs*). The greatest legendary hero of Athens was Theseus, said to have been the son of Aegeus, king of Athens. He was born and brought up in a far distant land, and his mother did not send him to Athens until he reached young manhood and was able to lift a stone under which his father had put a sword and a pair of sandals.

Arriving at length, after many dangers and adventures, Theseus found the city in deep mourning because it was time to send to Minos, king of Crete, the yearly tribute of seven youths and seven maidens to be devoured by the Minotaur, a terrible monster, half man, half bull. Theseus offered himself as one of the victims, hoping that he would be able to slay the monster. When he reached Crete, Ariadne, the beautiful daughter of the king, fell in love with him, and aided him by giving him a sword with which he killed the Minotaur, and a ball of thread by which he was able to find his way out of the winding labyrinth where the monster was kept. But he forgot the promise he had made to his father that if he succeeded in his undertaking he would hoist white sails on his ship when he returned, instead of the black ones with which the vessel had set out. The king, seeing the dark sails returning, and thinking that his son was dead, cast himself into the sea, which has since been called, after his name, the Aegean. Theseus now became king of the Athenians, and united the various village communities of the Attic plain into a strong and powerful nation. Many other brave deeds were ascribed to him. He was said to have been one of the Argonauts who went in search of the Golden Fleece, and in a war against the Amazons he conquered these famous women-warriors. He was once engaged in a contest of arms with Pirithoüs, king of the Lapithae, but the two heroes were so filled with admiration of each other that they swore eternal friendship. Theseus came to the aid of Pirithoüs in his struggle against the Centaurs (see Centaurs).

Theseus was killed by treachery during a revolt of the Athenians. In later times his memory was held in the greatest reverence, and at the battle of Marathon (490 B.C.) many of the Athenians fancied that they saw his spirit, clad in armor, charging at their head against the Persians. After the Persian Wars the oracle at Delphi ordered the Athenians to find the grave of Theseus on the island of Syros, where he had been killed, and to bring back his bones to Attic soil. The oracle's instructions were obeyed. In 469 B.C. the supposed bones of Theseus were carried back to Athens, and the tomb of the great hero became a refuge for the poor and oppressed of the city.

THIRTY YEARS' WAR. Like the separate acts in a great tragic drama are the series of religious and political conflicts in Germany between 1618 and 1648 which together are known as the Thirty Years' War. No one wonders today why the struggle began in 1618, but rather why the war did not break out earlier.

After the Peace of Augsburg in 1555, Germany was divided into two hostile religious camps—Lutheran and Catholic. A third group, the Calvinists, had been shut out from all the religious and political advantages granted to the Lutherans by this peace. As a result they hated and were hated by both Lutherans and Catholics with almost equal violence. The quarrels between these religious bodies were in themselves bitter enough to cause a war and led to the formation of a Catholic League and a Protestant Union in 1608.

In addition, on Germany's frontiers were strong neighbors who were only too anxious to profit by her troubles. France on the west looked with envious eyes at the left bank of the Rhine. On the north Denmark longed to extend her territory beyond the base of her peninsula; while her Scandinavian neighbor, Sweden, hoped to make the Baltic a Swedish lake.

All through the latter part of the 16th century Germany was like a tinder box surrounded by a wall of flame. A religious war was raging in France; and the Netherlands was engaged in a deadly conflict with Spain wresting from her political and religious freedom. Small wonder that eventually the spark spread to Germany and that it, too, caught fire!

The Flame Spreads

The conflagration began in Bohemia, the land of John Huss. The Protestants of that country revolted against their rigidly Catholic king, a member of the powerful Hapsburg family, who in a short time was elected emperor as Ferdinand II. He was not only bigoted in religious matters but stood for the plan to make the Bohemian crown hereditary in the Hapsburg line. May 23, 1618, his representatives were thrown out of a window at Prague, and Frederik, the count palatine of the Rhine and son-in-law of James I of England, the leading Calvinist prince in Germany, was elected king of Bohemia. The powerful Lutheran princes of Saxony and Brandenburg remained neutral for a long time. Frederik's support and Spanish and Jesuit activity caused the conflagration to spread until it involved all Germany. The Bohemian struggle was short. Frederik was defeated at White Mountain Nov. 18, 1620. The troubles of the empire furnished the opportunity for its neighbors to interfere, and a war that had started in Bohemia became a European conflict in which at different times Spain and Denmark took active parts, Sweden played a chief rôle, and France was the principal actor.

After the Bohemian period (1618-24) the struggle became a European conflict with three chief periods in it. In the first, 1625-29, King Christian of Denmark appeared as the champion of the German Protestants. He was no match, however, for the army of the Catholic League under Tilly or for the able Imperial general

Wallenstein who, without cost to the emperor, raised a large army drawn from every country of Europe but devoted to their leader.

The hero of the second period was the Swedish king, Gustavus Adolphus, likewise a Protestant champion. His brilliant victories over Tilly, a Catholic leader second only to Wallenstein in ability, forced the emperor to recall his former champion, Wallenstein, who had been dismissed at the demand of the Catholic princes. The period practically closed with the death of the military genius Gustavus Adolphus in 1632 (see Gustavus Adolphus). Wallenstein was again dismissed by the emperor and assassinated in 1633.

But in the meantime the turning point had been reached in 1628-29. In those years the apparently invincible Wallenstein failed to take the Protestant city of Stralsund on the Baltic after weeks spent in besieging it. In 1629 the emperor proclaimed the restitution of all lands taken from the Catholic church since 1552. Their selfish interests now urged all Protestant princes to fight against the Army of the Catholic League and against Wallenstein, who cared nothing for religion but had plans for his own power and for a strong German empire. The French Protestant city, Rochelle, fell before an equally stubborn siege conducted by Louis XIII and his minister, Cardinal Richelieu. This was the end of political privileges for the Protestant Huguenots of France. But the Protestant defeat in France was a Protestant triumph in Germany, for it freed Richelieu from troubles at home and enabled him to interfere actively in Germany, first in support of Gustavus Adolphus and then independently.

Thus the last period was the French, 1635-48, when Richelieu and Mazarin used the French armies under Turenne to secure French dominance. That a Catholic country under cardinals of the church as leaders should interfere in behalf of the German Protestants shows that the war had ceased to be a religious conflict. It was by this time a scramble for more territory. In the scramble the Spanish Hapsburgs aided the Austrian Hapsburgs against the German Protestants, Sweden, and France.

The Desolation of War

By this time the people of Germany were too wretched to care much which side won. For 17 years armies had marched back and forth across the country and any wealth that escaped falling into the hands of the foe was taken by friends. Indeed to most of the people Catholic and Protestant armies were alike evils to be dreaded. All except that of Gustavus Adolphus had lived on the country through which they passed, until by the close of the war in 1648 there was little left but desolation. The starving inhabitants in battle areas followed the armies as hangers-on. Education and morals disappeared with their homes. In one district where before the war there had been 1,717 houses, only 627 remained and of these many were untenanted for only 316 families could be found in the district. The flourishing city

of Augsburg was left with 16,000 inhabitants in place of 80,000. Other cities and villages were entirely wiped out and many of them were never rebuilt. The clock of history in Germany was turned backward two centuries by the horrors of the Thirty Years' War.

All parties were exhausted and in 1641 peace was seriously discussed. But the war went on, for the questions involved were so complicated that it was not until 1648 that the Treaty of Westphalia was finally signed. The religious settlement recognized Calvinism. The princes of Germany might choose the religion for their land—Catholic, Lutheran, or Calvinist; church lands were to belong to the sect that held them in 1624.

The political questions were more difficult to settle but France and Sweden really determined the division of Germany. In the end Sweden received extensive territories on the German coasts of the Baltic and North seas; France obtained Alsace; the Lutheran states of Saxony and Brandenburg (Prussia) in Germany received additional territories; Spain acknowledged the independence of the United Netherlands (Holland), and Swiss independence was confirmed. The princes of Germany became practically sovereign with power to form foreign alliances and any possibility of a united Germany was further limited by decreasing the power of the emperor and the Diet. The Holy Roman Empire of the German people continued a formal existence until 1806 but it was only a hollow shell. Richelieu's plan of making France dominant in Europe was realized in the reign of Louis XIV.

THISTLE. When King Alexander III was king of Scotland (1241-1285), King Haakon of Norway landed an army on the shores of that kingdom and attempted to conquer it. But in his night attack on the Scottish camp at Largs, a barefoot Norseman trod on a thistle and cried out in pain. The Scots took the alarm,

the attack failed, and soon afterward King Haakon had to withdraw his army and surrender the Hebrides Islands to Scotland. In remembrance of the battle of

THE NATIONAL EMBLEM OF SCOTLAND



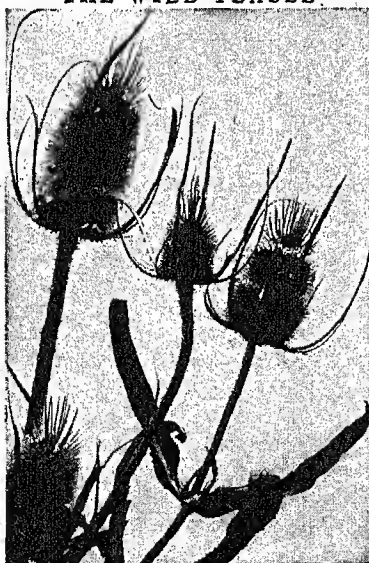
The Spear Thistle (*Carduus lanceolatus*) seems to be the original Scotch thistle. That honor is also claimed for other thistles, but this spiny variety appears to have the best claim.

Largs, the Scots adopted the prickly purple thistle for their national emblem. In 1540 an order of knighthood, called the "Order of the Thistle" or "Order of St. Andrew" was established by King James V of Scotland.

Several varieties of this vigorous plant are distributed over the United States. They are mostly weeds, although many of them, with their stout stems and spiny leaves, surmounted by soft silky flowerheads of purple, pink, yellow, or white, are very handsome. They are very hard to eradicate, however, and are a source of never-ending annoyance to the farmer. The Canada thistle especially

—known also as corn thistle, creeping thistle and Scotch thistle—is a great nuisance in the New World,

THE WILD TEASEL



The Teasel does not belong to the thistle family, but in general use it often gets the name. One species, called the "Fuller's Teasel," is cultivated because its heads are set with hooked spines and are used for "fulling" or raising the nap on woolen goods.

to which it has found its way from the Old. This variety grows from one to three feet high, and has small rose-colored flowers. Like all thistles, the flower heads form large downy seed balls, which the wind scatters far and wide. The long fleshy underground stems, found just below the level usually reached by the plow, are hard to tear out, and any little piece of root left in the ground will form a new plant.

The beauty of a few varieties of thistle has won for them a place in many gardens, particularly the blue-flowered globe-thistle, and the cotton thistle, a tall branching plant with large spiny leaves covered with white cotton-like hairs. The latter variety grows wild in some parts of the United States. The milk thistle is sometimes cultivated for its root stalks, which are eaten like salsify.

The teasel, a native of southern Europe, but cultivated in the United States and elsewhere, is widely used in cloth-making. The heads are cut off when in flower and dried. Their oblong hook-pointed prickles are used

for "fulling" or raising the nap of cloth, and do the work better than any mechanical device which has been so far invented.

A number of plants similar to the thistle are sometimes called by that name, among them the spiny Russian thistle or tumbleweed, a curious and common plant of the western United States.

Scientific name of Canada thistle, *Carduus arvensis*; of the fuller's teasel, *Dipsacus fullonum*. The *Carduus lanceolatus* seems to be the prototype for the national emblem of Scotland, although that honor is often claimed for the cotton thistle, *Onopordon acanthium*.

THOMAS, GEN. GEORGE HENRY (1816-1870). "The Rock of Chickamauga" was the title given to General Thomas because of the steadfastness with which he held his position on that famous battlefield in the Civil War. This steadfastness of courage and purpose made him a great general even in the midst of defeat.

A Virginian by birth, he received his military training at West Point, graduating in 1840 as a classmate of Gen. William T. Sherman. His first military experience was gained in campaigns against the Indians and in the Mexican War. On the outbreak of the Civil War, he decided after much hesitation to remain loyal to the Union. He was made a brigadier-general and was sent into the valley of Virginia to aid the Unionists of that region. Soon he was transferred to Kentucky, where he defeated the Confederate forces in January 1862. For this victory he was promoted to the rank of major-general of the volunteer army.

General Thomas' remaining service in the War of Secession was all in the West. In the hard-fought battle of Stone River, Tenn., he rendered conspicuous service, showing his characteristic quality of steadfastness. At Chickamauga (Sept. 19-20, 1863)—one of the fiercest battles of the war, involving Union losses of 16,000 and Confederate losses of 18,000—when the Union right was routed and General Rosecrans, the commander, gave up the field for lost, General Thomas held his position on the left against repeated attacks of the victorious Confederates, thus saving the army. In the battle of Missionary Ridge (Nov. 25, 1863) his troops carried the enemy's rifle-pits at the base of the ridge, scaled the heights, and captured the Confederate lines on the crest.

During the Atlanta campaign, which ended in the capture of that city, Thomas rendered conspicuous service. When Sherman started on his march through Georgia, he left Thomas to oppose the Confederate army under General Hood, who moved into Tennessee. Thomas hurried to Nashville, but when his opponent appeared before that city he delayed to attack, taking time to organize and equip the new troops that had been sent to him. Fault was found with him for his slowness to act, and an order was given for his removal. Before the order reached him, however, General Thomas had attacked and completely crushed Hood's army, on Dec. 16, 1864, winning one of the important victories of the Civil War. For this victory he received the thanks of President Lincoln and of Congress, was promoted to the rank

of major-general in the regular army, and was given a gold medal by the state of Tennessee.

After the war General Thomas remained in the army and was in charge of several military districts. He declined the rank of lieutenant-general, which was offered him, saying that he had done nothing since the war to merit promotion.

No officer in the Civil War inspired in his men a greater measure of enthusiasm and personal devotion than "Old Pap" Thomas, as he was affectionately called by his soldiers; and as a commander he showed qualities of the highest order.

THOR. Ages ago, according to the myths of the Northland, there lived a powerful young god named Thor. It was he who chased away the frost and called gentle winds and warm spring rains to release the earth from its bondage of ice and snow. The lightning's flash was his mighty hammer Mjölhnir, hurled in battle with the frost giants, and the rolling thunder was the rumble of his fiery chariot.

I am the god Thor,
I am the war god.
I am the Thunderer!
Here in my Northland,
My fastness and fortress,
Reign I forever!

Here amid icebergs
Rule I the nations;
This is my hammer,
Mjölhnir, the mighty;
Giants and sorcerers
Cannot withstand it.

—Longfellow.

Thor was a good-natured, careless god, always ready for adventure, and never tired of trying his great strength. He could shoulder giant oaks with the greatest of ease and slay bulls with his bare hands. For sport he sometimes rode among the cloud-veiled mountains, hurling his hammer at their peaks and cleaving them in twain.

This adventurous god once visited Jotunheim, the land of the frost giants. The king of the giants looked at him scornfully and said: "Is this stripling the mighty god Thor? Perhaps you are mightier than you appear. What feats do you deem yourself skilled in?"

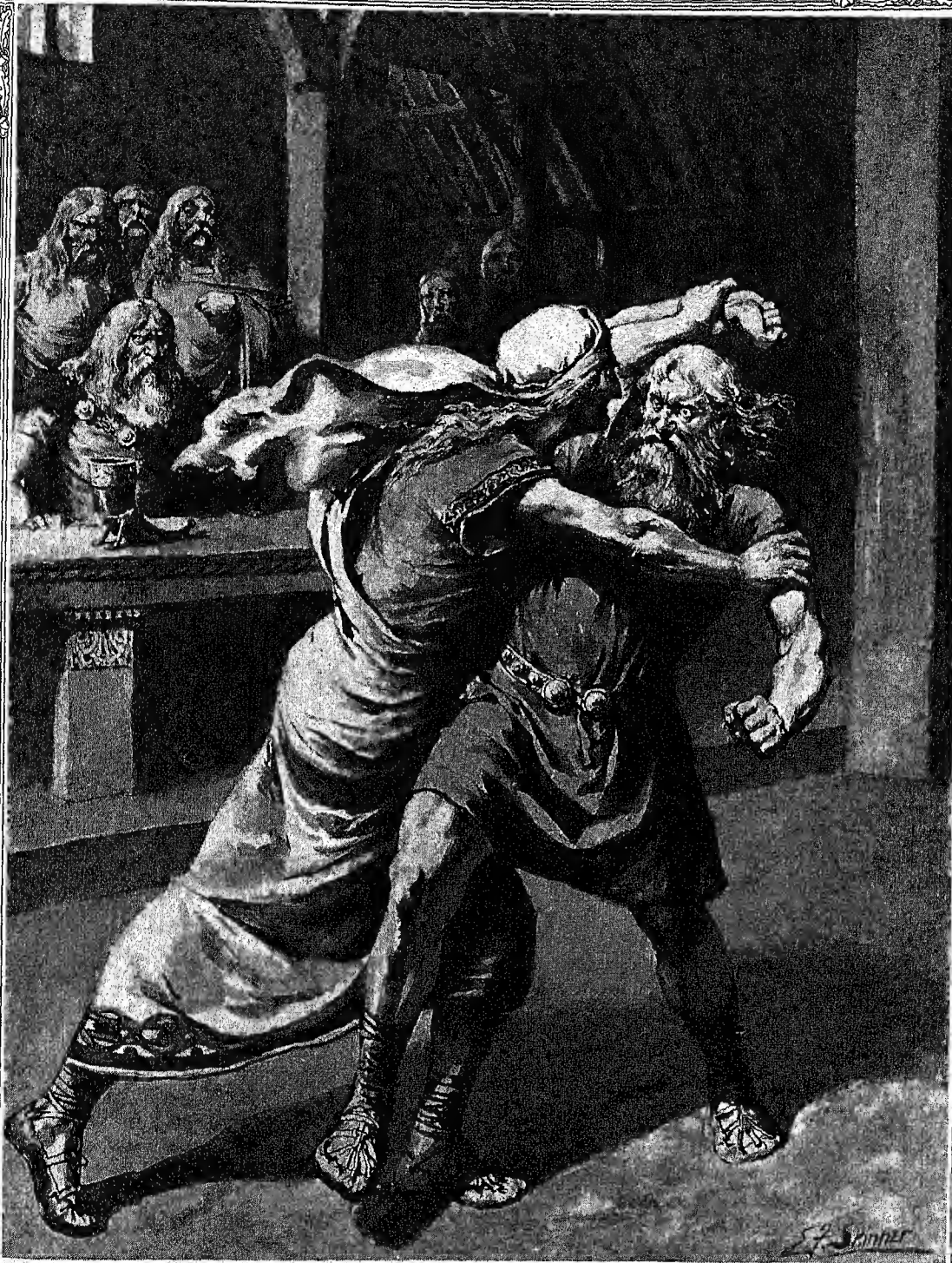
"I will test my prowess in a drinking bout with anyone," said Thor, his eyes flashing fire.

The king thereupon bade the euphearer bring a drinking horn and said: "Whosoever is a good drinker is able to drain this horn at a single draught." Thor placed the horn to his lips and drank long and deep, but when he removed it the liquid had scarcely diminished. Three times he tried to empty the horn and failed, and at last he threw it down in disgust.

Next he attempted to lift the king's eat from the ground, but only succeeded in raising one of its paws. The giants jeered and shouted, saying, "Is this the mighty god whom we have been taught to fear?"

Thor then offered to wrestle with anyone who would stand against him, and a toothless old woman accepted the challenge. With mad rushes Thor

THOR STRIVES IN VAIN TO OVERCOME OLD AGE



Once, when Thor visited Jotunheim, the land of the frost giants, the King of the Giants realized that Thor was stronger than any of his people, and that only trickery could overcome the mighty god. So he taunted Thor, calling him a stripling, until Thor offered to prove his strength and endurance. In each of these feats he failed, not because he was weaker than the giants, but because the King had tricked him into three impossible tasks. Here you see him at his third task, trying to overcome Old Age, whom no man may conquer. But he held her off for a long time, and as the King of the Giants said, to stand against the old crone for so long a time was marvelous. The King and his warriors looked on in amazement at the god's strength, until finally he gave up in disgust and fled from the palace.

attempted to throw the old crone to the floor, but in spite of all his efforts could not succeed. In shame he left the palace. When safely outside its gates, the king of the giants came to him and said: "Mighty Thor, when you attempted to empty the drinking horn you performed a feat so marvelous that, had I not seen it myself, I should never have believed it. The sea itself lay at the end of that horn, and when you come to the shore you will see how much of the waters have fallen away. Terror overcame me when you lifted the cat's paw from the floor, for that cat is the serpent Midgard, who encircles the earth, and the whole world shuddered when its hold was loosened. To stand against the old crone for so long a time was marvelous, for it was indeed Old Age with whom you wrestled, and no man may conquer her. Magic, and not the prowess of the frost giants, has overcome you."

Thor, in wrath at being so tricked, reached for his hammer; but when he would have thrown it, the giant had disappeared.

This is but one of the many stories told of the powerful Thor. In his honor the fifth day of the week is still called "Thor's day," or Thursday.

THOREAU (*tho-rø*), HENRY DAVID (1817-1862). At the age of 28 Henry Thoreau, Harvard graduate and carpenter, scholar, and woodsman, resolved to simplify his life. He felt that he was paying too dearly for his livelihood. "The cost of a thing," he wrote, "is the amount of what I will call *life* which is required to be exchanged for it"; and Thoreau decided that the various employments he had tried his hand at—surveying, carpentry, school-teaching, pencil-making—all took more of his life than he was willing to exchange for a living.

"To maintain one's self on this earth is not a hardship but a pastime, if we will live simply and wisely," he said; and acting on this theory he went off to see how cheaply he could live on the shore of Walden Pond, near his native town of Concord, Mass. He borrowed an ax and built a cabin with a capacious fireplace. He cleared a little patch of ground and raised beans, peas, potatoes, and sweet corn. Such money as he needed to buy clothing and the food-stuffs he could not raise, he obtained by selling some of his vegetables and by working at one of his trades for six weeks during the summer. By thus reducing the machinery of life to its lowest terms, Thoreau supported himself for two years at an average cost of 27 cents a week, and of only six weeks' paid labor out of the 52 weeks of the year.

He has left us an account of his experience in his 'Walden', one of the most interesting and stimulating works in American literature. Nature and great books were the things he chiefly loved, and the leisure he won by simplifying his life he spent in thinking and

writing. He got close to the life of the animals, which loved him as he loved them. The birds, forgetting their fear of man, came at his call; the beasts were his friends; even fish swam unafraid to his hands.

When Thoreau had had enough of this hermit life, he quietly returned to Concord and spent his remaining days there, writing much, sometimes lecturing or making pencils for a living. Consumption carried him off at 45, despite his open-air life.

Fond of solitude as Thoreau was, he had a few close friends, of whom Emerson was one of the closest. In manner he was outspoken, he made no effort to please, and to many appeared cold; but those who penetrated beneath the outward appearance found in him warm sympathy, cheerfulness of disposition, a high and deep spirituality, and the wisdom that comes to those who have lived close to reality.

Emerson sums up his life in these words: "He was bred to no profession;

he never married; he lived alone; he never went to church; he never voted; he refused to pay a tax to the state; he ate no flesh; he drank no wine; he never knew the use of tobacco; and, though a naturalist, he used neither trap nor gun."

Thoreau's works are: 'A Week on the Concord and Merrimac Rivers' (1849); 'Walden, or, Life in the Woods' (1854); 'Excursions' (1863); 'The Maine Woods' (1864); 'Cape Cod' (1865); 'Letters' (1865); 'A Yankee in Canada' (1866); 'Early Spring in Massachusetts' (1881); 'Summer' (1884); 'Winter' (1887); 'Autumn' (1892); 'Miscellanies' (1893); 'Journals' edited by Bradford Torrey (1906).

THORVALDSEN, BERTEL (1770-1844). Copenhagen is bright with waving flags, and gay crowds in holiday attire throng the streets. A royal frigate comes to its dock amid such cheering as Denmark's capital has seldom heard. A returning hero is led to a royal carriage; the joyous people loose the horses from the shafts, and fight to haul the carriage in splendid triumph. In it sits Bertel Thorvaldsen, greatest of Danish sculptors and one of the greatest sculptors of modern times. He is returning to his native city after an absence of many years, and Copenhagen is merely echoing all Europe's glowing praises of his fame.

This glorious reception occurred one bright September day in 1838. It contrasted strangely with the hero's drab childhood. His parents had been so poor, the boy Bertel hardly had time to learn to read and write. The artist's father, Gotskalk Thorvaldsen, who had been a rather unskilled carver of figure-heads for ships, was the son of an Icelandic clergyman; his mother was a Jutland peasant.

Bertel was born Nov. 19, 1770, probably in Copenhagen. He entered his first sketching class when 11 years old. In 1793 he won the Great Gold Medal, and with it a stipend to cover three years of study in Rome. But his circumstances were so poor he did not get to Rome until four years later. Meantime, in

THOREAU



The Sage of Walden Pond

Copenhagen, Thorvaldsen mingled with artists who were as poor as himself. Always a lover of dogs, he had a poodle, "Mons. Primong," which was famous because it learned to bite the legs of creditors who came to worry its master!

In Rome Thorvaldsen was inspired to revive the classic sculpture of ancient Greece, and there he was often ill and often discouraged. His fame began in 1803, with his colossal statue, 'Jason and the Golden Fleece'. In 1804 he was appointed a professor at the Academy of Florence. He was elected to the *Accademia di San Luca* of Rome in 1808, and became president of this famous group in 1825.

Among Thorvaldsen's best-known works are 'Briseis', 'Cupid and Psyche', 'Morning', 'Night', 'Christus Consolator', and his portrait statue of Byron. His famous 'Lion of Lucerne', carved in natural rock to commemorate the heroic defense of Versailles by the Swiss Guards, was executed from Thorvaldsen's model. Some of his finest works are in private collections.

Thorvaldsen was called to Copenhagen by his king in 1819 to arrange for statues of Christ and the 12 apostles for a new church. He returned to Rome to complete the task, and his great triumph at Copenhagen came when he returned there 19 years later. He disliked statues set in niches; he held that only the front of such works required care and so with that in mind he made the church statues far too large for the niches.

Thorvaldsen's will left all his works, as originals or replicas, to the city of Copenhagen, and provided a fund to build a museum to house them. The Thorvaldsen Museum is one of his city's proudest possessions. The sculptor died while at the theater on March 24, 1844. His remains rest in a vault in the museum.

NOT A CRUMB IS WASTED



Perhaps this mother Thrasher has heard something about the conservation of food. Certainly she is making sure that no morsel of the food which she has captured and brought for her youngster shall be lost. You will notice that the baby has a good-sized "intake," and uses it willingly.

THRASHER. The flute, the violin, and the clarinet are all represented in the beautiful notes poured forth by the brown thrasher, one of our most delightful song-birds, as he sits on a conspicuous perch at the top of a tree or bush and gives a concert for all the

world within hearing. He is often mistaken for the mocking-bird, and like that bird-artist he frequently sings on moonlit nights. He sings in an impassioned manner, and one author has said: "As the fervor

THORVALDSEN'S MEMORIAL TO SWISS VALOR



Thorvaldsen's 'Lion of Lucerne', in Glacier Garden, Lucerne, commemorates the Swiss Guards who, on Aug. 10, 1792, died in defense of the Tuileries in Paris, where Louis XVI and the royal family had sought refuge. It bears the Latin inscription, "To the loyalty and courage of the Swiss."

increases his long and elegant tail droops; all his feathers separate; his whole plumage lifted, it floats, trembles; his head is raised and his bill is wide open; there is no mistake; it is the power of the god." And not only as a singer does the brown thrasher excite our admiration, but as a warrior, for his courage in protecting his family often amounts to positive heroism. His habit of switching his tail about when he is angry probably accounts for the name thrasher.

There are several species of thrashers, which with the mocking-bird and the catbird make up the group of "mimic thrushes," found only in America. The brown thrasher (*Toxostoma rufum*) is found in the eastern United States ranging north to Canada and west to the Rockies. It is about 11 inches long, with a

bright brown coat and a buff-colored breast streaked with brown. The bill is long and curved downward at the end, and the short wings and much longer tail are rounded.

THREAD. The convenient spool of cotton thread, so indispensable now, was unknown a century and a half ago. There was only linen thread, sold in hanks just as knitting yarn is today. The idea of using cotton fiber for thread was hit upon by an American woman, Mrs. Samuel Slater, of Pawtucket, R.I., in 1794. Thread manufacturing in the United States is centered in New England. Paisley is the center of the industry in Scotland, and Manchester in England. Linen thread, which is used where great strength is required, is made chiefly in Ireland.

The best grade thread is made from long-fibered Egyptian cotton. It is spun just as for weaving (see

Cotton; Spinning and Weaving), and numbered according to the size of each of the six single strands of which thread is composed. A single strand of 840 yards is taken as the unit length. One pound containing one hank of 840 yards is No. 1 thread. One pound containing 60 hanks is No. 60, and so on. Thus the number increases as the size decreases.

The wood from which the spools are made is cut into bars a few feet long and less than two inches square. A lathe converts these bars into round rods. Cut into spool lengths, the pieces are fed to a boring machine that pierces them lengthwise, making round holes through the center so that the spool can be mounted on a sewing machine. Then a cutting machine shaves off a ribbon of wood, leaving the edges raised, and the spool is finished.

The winding machine has many revolving spindles, on each of which a spool is held while the thread is wound, a guide traveling to and fro spreading the thread evenly over its surface. When full the spindle stops, and a metal finger moves across the spool, catching the loose thread. At the same time a knife comes up and cuts a notch in the flange. The finger carries the thread over the notch, and a second finger catches it and pulls it firmly down. As the thread is cut free the filled spool is pushed off, an empty one taking its place. Numbered paper labels are stuck on by another machine.

The first sewing thread was composed of three strands. The necessity of stronger, smoother thread resulted in the modern six strand. The same diameter thread is now composed of double the number of strands, half the size of those formerly used.

THRESHING. The ancient method of shelling out grain was by rubbing the heads between the hands, treading out the grain with the oxen on the threshing floor, or pounding the grain with ponderous hand flails—two sticks hinged together by a stout thong. When threshing was done with the hand flail, and the grain was winnowed by tossing it up so that the wind might carry away the chaff, the work occupied much of the time of autumn and winter. This work a modern threshing machine now accomplishes in a few hours, though the primitive methods still prevail in many backward regions of the world.

The first really successful threshing machine was invented by a Scottish mechanic named Andrew Meikle, in 1786. Little was done toward improving it and putting it to work until 1840, but the development of the modern American thresher followed rapidly after that date.

Threshing on a modern farm is a fascinating operation. On a hot sunny day in summer the threshing machine, drawn by a steam engine or gasoline tractor, labors clumsily along the road and turns in at the farmyard gate. Soon a steady hum announces that the work has begun, and the sheaves disappear rapidly down the broad throat of the monster. Two men are busy pitching the bundles to the self-feeder. Keen knives automatically cut the binding twine and the

loosened grain is drawn between the teeth of a rapidly whirling cylinder which shells out most of the grain. Pickers, beaters, and shaking forks, which cause the huge frame of the machine to vibrate with their tireless energy, complete the separation. The chaff and refuse are removed by a set of screens and a fan blast. The grain is then either automatically measured into sacks or dumped straight into a wagon and hauled away to the elevator. The straw and chaff are blown out through a long tube, from the end of which they issue in a golden stream onto the top of the stack pile.

Even more wonderful than the threshing machine is the combined harvester and thresher, called the "combine." This machine, as the name implies, consists of a cutter and portable thresher mounted on the same frame and operating simultaneously. The grain is handled exactly as in a standard type thresher, in bulk or in sacks. The straw and chaff fall to the rear of the machine, and are raked up and stacked in a separate operation.

The thresher may be adjusted to different grains, but there are also special machines for threshing clover, rice, peanuts, peas, and beans, and for husking corn and shredding the fodder. Owing to the high cost of threshing machines, and the short time a farmer needs one each year, usually one man in a neighborhood owns an outfit and does all the threshing. Sometimes the farmers form a cooperative association for this purpose.

THRIFT. "If you would know the value of money, go and try to borrow some; for he that goes a-borrowing goes a-sorrowing."

"A penny saved is a penny earned."

"Heaven helps them that help themselves."

"Save, young man, and become respectable and respected. That is the surest way. If you would be wealthy think of saving as well as of getting."

America's foremost exponent of thrift, Benjamin Franklin, left us these words of wisdom (*see* Franklin, Benjamin). When he was 24 years old Franklin drew up a set of rules to guide his life. One of those rules reads: "Frugality. Make no expense but to do good to others or yourself; i.e., waste nothing."

Thrift Builds Up Great Fortunes

Some of the world's richest men of later days have been ardent disciples of Franklin's policy. Men like Andrew Carnegie, John D. Rockefeller, John Wanamaker, George Peabody, and Peter Cooper got their start on the road to financial success by practicing thrift. Rockefeller earned his first money when he was seven years old by raising turkeys, feeding them milk curds his mother gave him. He kept his accounts in a little book he later called "Ledger A"; that ledger is now a prized possession of his family. Peter Cooper as a boy worked for \$2 a month; he became a millionaire by "hard work, living within his means, saving his time, and common sense."

Adolph Ochs, the publisher, began work as a "printer's devil" in a Chattanooga newspaper office; thrift enabled him to buy his first newspaper, and by

continued thrift he bought other papers and built up his great fortune. Henry Ford's success, and his tremendous wealth, can be traced to thrift in the management of his business; he built up a large staff of experts solely to eliminate waste. (See Ford, Henry.)

Thrift means the prudent management of all one's resources. It means not merely careful saving but careful spending as well. The miser, who hoards his money and refuses himself and those near to him even the necessities of life, is not a thrifty man. He is, in a sense, a spendthrift, for he throws away his opportunities for happiness. The really thrifty person spends as cheerfully as he saves, but he spends wisely: he "gets the most for his money," and he saves for future needs, or perhaps for something he wants that is beyond his immediate purse.

Joe and Jim were playmates at school. Their parents were in about the same circumstances. Joe earned a little by delivering orders for a grocer, and Jim made exactly the same amount with a newspaper route. When Joe spoke to his father about money to pay for a circus ticket, he was asked what he had done with his earnings. He said that he had spent it all on candy, baseballs, and kites. Then his father told him that he would enjoy the circus more if he paid his own way. Joe thought it over and agreed the idea was a good one and so he began saving a few cents every week, which he put first in his bank at home and then he put some money also in the school bank. He never failed to save a little.

"He Could Not Save"

Jim's father gave him the money for the circus ticket without asking Jim what he did with the money he earned. Jim's dad was rather careless with money. So was Jim; he was always "broke," always borrowing a dime or a quarter from Joe or from one of the other boys. Jim always paid back, of course; he was perfectly honest, but he could not save his money.

Joe and Jim entered the same business together, and each has earned the same pay for years. Their family responsibilities were about equal. Joe has a comfortable bank account, which guarantees his children a college education. He owns his home, and he has quite a few shares of stock in the firm for which they work. He paid cash for his automobile; and thereby secured a good discount.

Jim is always in debt, just as he was when a boy. He has no bank account, not even a sizable life insurance policy to protect his family should he die suddenly. Jim pays rent; he never can get a start towards buying a home, he complains. Of course, he owns no shares in the company, because he "never could spare" the few dollars taken from the employees' pay each week to buy the stock. He has an automobile, too; a much more expensive one than Joe's, but Jim bought his on the instalment plan. Every so often he falls behind in his payments and borrows from Joe to keep the dealer from taking back the car. Jim has been borrowing from Joe so long that it is a habit, and they both joke about it.

Most of us know people like Joe and Jim. We know two men, or two women, or two families that have exactly the same resources and the same living standards, and one of them "thrives" (that word comes from "thrift," you know), while the other is always in debt, always too "poor" to save.

Instalment Buying and Thrift

America is called the most thriftless nation because it has so many Jims. The wide growth of the instalment system of buying is blamed by some for America's lack of foresight, but the charge is not altogether true. Our Joe bought his home on the instalment plan; he bought his stock in the firm the same way. But he bought wisely; his instalment buying was an *investment*; he bought within his means. When his friend Jim bought that more expensive automobile on the same plan, he bought unwisely; a cheaper car would have served him as well. His resources, indeed, did not warrant his having an automobile at all, because he had no reserve fund to guarantee that he could meet his payments if he should lose his job suddenly, or if some accident in the family caused an unexpected expense. America is called a thriftless nation because so many of its instalment purchases are unessentials, and because the "easy payment" system leads many people to buy beyond their means. (See Instalment Buying.)

There is much more to real thrift than the mere security that a reserve fund offers. Thrift is a habit which builds up one's character. Often it takes courage to save even a little money when there are many things one seems to need. Each time the urge to buy what is unnecessary rather than to save is overcome, one's character is strengthened.

The national emergencies of recent times have taught the people of the United States that thrift is a patriotic duty. When the nation entered the first World War in 1917, the Liberty Loan Drives showed them that few were too poor to save money and lend it to the government for the national welfare. And after 1935, when the nation's security was again menaced and the government issued savings bonds in small denominations, the people bought largely and enthusiastically.

Schools Stress Need of Thrift

The development of thrift habits has become an important aim of America's schools. Thousands of schools maintain savings banks. (See Banks and Banking.) Deposits are made by pupils on scheduled days, and the funds are put in banks subject to the depositor's call. The habit of thrift, thus established in childhood, is likely to continue through life.

There is also a growing national movement to encourage thrift. Banks, security companies, and other agencies of the same sort offer many helps to the person who wants to save but does not know how. The "budget plan" is a wonderful help. It is a simple but useful plan. One's expenditures are balanced against one's income, with a definite margin allowed for saving. (See Home Economics.)

There is a National organization to promote thrift in the United States, and the week beginning with January 17 is set aside as "national thrift week." During this annual "drive" the benefits of saving and careful spending are impressed by means of newspaper and magazine articles, lectures, and radio broadcasts by leading economists and bankers.

THRUSH. The large thrush family with its 150 species boasts some of the finest musical artists in birdland. Among its famous members are the robin, the bluebird, and the nightingale, as well as those commonly known by the family name. In general appearance the different species vary in size and coloration. Most are feathered in browns and buff; others, as the robin and bluebird (for illustration in colors see *Birds*) show bright colors. But whatever the color of the parent birds, all young thrushes, until their first autumn molt, have spotted breasts. Some of the species live in trees, others on the ground; some feed on insects, others on fruits, and some eat both.

Thrushes are almost cosmopolitan. In England the song-thrush or mavis, the missel-thrush, and the nightingale are the best known species.

The song of the mavis is so musical as to frequently be mistaken for that of the nightingale.

The family is well represented in the New World. In the United States the wood-thrush and hermit-thrush are two of its finest species. These are slender birds, about seven inches long, and both have spotted breasts. Both are wonderful singers. The hermit, a bit the smaller of the two, nests on the ground, and the wood-thrush in low bushes. Both lay three or four greenish-blue eggs. Wilson's thrush or veery is similar in appearance and nesting habit, though most retiring in disposition. His song, as described by Ernest

Thompson Seton, is a soft silvery tinkling, suggesting the syllables *veero, veery, veery, veery*, which doubtless gave the bird his name. (See also Bluebird; Nightingale; Robin.)

Scientific name of thrush family, *Turdidae*; of the wood-thrush, *Hylocichla mustelina*; hermit-thrush, *Hylocichla guttata*; veery, *Hylocichla fuscescens*.

TIBER RIVER. The swift-flowing stream on which ancient Rome was built is laden with historic memories and associations. Many are the triumphs the

THE SONG OR WOOD THRUSH



The Wood Thrush is a great favorite among bird lovers because of his sweet song. He is smaller than the robin, being about 7 or 8 inches long. His head is brown, changing from a bright cinnamon at the head to a light olive brown at the tail, and underneath he is marked by large round black spots.

river witnessed in the days of imperial Rome's greatness, many are the dark deeds done on its banks, and many times have its yellow waters run red with blood. The Romans fondly called it "Father Tiber"; for they loved the stream which watered their land, joined the city with the sea, and helped to protect them from invasion. Yet sometimes the river god appeared to be angry, for the swelling waters rushed over the land in disastrous floods; as indeed they have done even in recent times, though massive embankments have lessened this danger.

Beginning as a little bubbling mountain brook on the western slopes of the Apennines, the Tiber is joined by other small streams as it flows southward

and westward to the Mediterranean. As it gains in force and volume, it gathers great quantities of tawny clay, which gives it its famous yellow color. So much sediment has been deposited at its mouth that Ostia, the ancient port of Rome, is now more than four miles inland. The Tiber is the most important stream of Italy south of the valley of the Po. Along its winding course of 245 miles are many cities, chief of which is Perugia, which like Rome is filled with interesting remains of ancient days. The Tiber is navigable for small steamers to Rome, 17 miles from its mouth, and for lighter boats for about 60 miles farther up.

How Horatius Kept the Bridge

IN the brave days of old—according to an ancient legend told by the Romans and retold by Macaulay in his stirring 'Lays of Ancient Rome'—the city of Rome was threatened by an invasion from the neighboring state of Etruria. A line of Etruscan kings before this time had ruled over Rome, but the last of the Tarquins, as this line was called, had been expelled, and Rome had become a republic. Now in order to reestablish their power, the Etruscan leader, Lars Porsena of

Clusium, had raised a large army and was marching toward Rome, burning villages and causing the homeless people to flee in terror to the city walls.

News came that the Etruscans had taken the Janiculum, the outpost on the Tiber's farther shore and would cross the bridge into Rome. "The bridge must straight go down," ordered the consul, but hardly had he spoken when he realized that the vanguard of the army would be upon them before this could be done.

Then up rose a brave Roman named Horatius, who offered at the risk of his life to hold the Etruscans at bay while the Romans cut the bridge down. Two of his friends took their places by his side, while their countrymen seized their axes and smote upon the stout timbers which supported the bridge.

Meanwhile the Tuscan army,
Right glorious to behold,
Came flashing back the neonday light,
Rank behind rank, like surges bright
Of a broad sea of gold.
Four hundred trumpets sounded
A peal of warlike glee,
As that great host, with measured tread,
And spears advanced, and ensigns spread,
Rolled slowly toward the bridge's head,
Where stood the dauntless Three.

Against that great host these three men stood their ground and smote one after another of the famed Etruscan leaders. Horatius himself received

a blow from the boldest of them all, but "like a wildcat mad with wounds" he turned fiercely upon his assailant and slew him, striking terror into the hearts of all the foe.

And now, so well had the Romans worked at the bridge that it hung tottering over the foaming tide. "Back ere the ruin fall!" cried the Fathers of the city. The two companions of Horatius darted back, but brave Horatius stood alone on the other side until the bridge fell crashing into the foaming Tiber. Then he turned toward the river with these words:

O Tiber! Father Tiber!
To whom the Romans pray,
A Roman's life, a Roman's arms,
Take thou in charge this day!

and plunged into the stream. The current was swift, for the river was swollen with months of rain. But bravely did Horatius struggle, in spite of his wound and his heavy armor, and the good Father Tiber bore him safe to shore. He was received with shouts of joy, and rewarded with land,

As much as two strong oxen
Could plough from morn till night.

A statue was erected to his honor in the public square and ever afterward his countrymen loved to tell the story of his heroism.

WHEN HORATIUS SAVED ROME



But friends and foes in dumb surprise,
With parted lips and straining eyes,
Stood gazing where he sank;
And when above the surges

They saw his crest appear,
All Rome sent forth a rapturous cry.
And even the ranks of Tuscany
Could scarce forbear to cheer.

TIBET. If you should scale the sides of Mount Everest, the highest peak on earth, which juts out of the Himalayan range of upper India, and should look northward, you would see mysterious Tibet, the country that has been called the "top of the world." No other part of the earth's surface is so crowded with massive and lofty mountains. Even the valleys of Tibet are higher above the sea than the tallest peaks of the Rockies, for the mean altitude of the entire table-land is 15,600 feet.

It is a barren, rocky, windswept land that marches upward from the Himalayas toward central China—as if the hungry earth were showing gaunt teeth. Most parts of the land are dry and cold, others are swept with rain, hail, and snow the year around, while still others suffer from intense summer heat. The northern plateau of Tibet, an area about as big as France, is dotted with innumerable large and

small lakes, often salty or alkaline; while the boggy country in between bears stunted vegetation. Occasionally great pillars of salt stand out, carved by the action of wind and cold, while near by perhaps is a hot spring, whose overflow has been frozen solid by the bitter wind. Here are found the yak, the wild ass, deer, antelope, wild sheep, wild goats, bears, leopards, wildcats, otters, wolves, foxes, and wild dogs—all in great numbers.

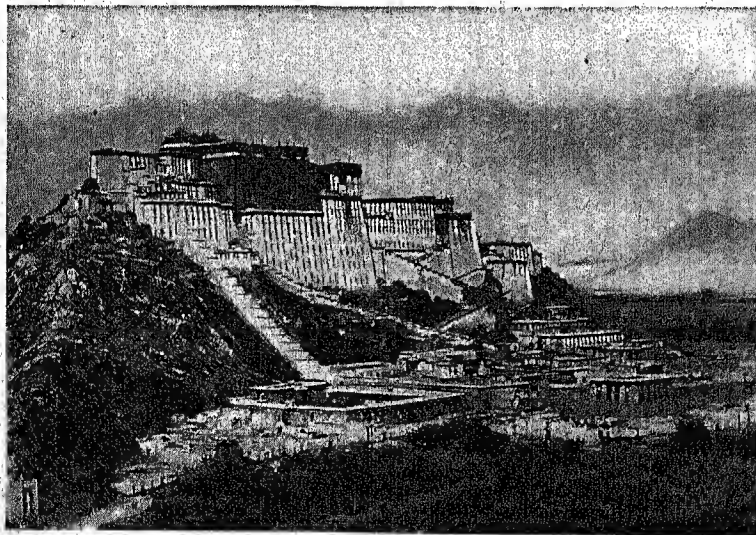
The general atmosphere of bleak desolation is relieved by a great valley splitting the country in two from east to west. Here flow the headwaters of the great Brahmaputra River, which later forces its way through the eastern end of the Himalayas into India, where it joins the many-mouthed Ganges before flowing into the Bay of Bengal. Not far from the source of the Brahmaputra rises the historic Indus, which flows around the other end of the Himalayas into the Arabian Sea. In the Brahmaputra valley protected mountain sides are covered with fine forests, fruit trees can be cultivated, and fields are green with barley, buckwheat, and a few vegetables. Here dwell most of the inhabitants.

The customs of the Tibetans are primitive, and their trades and industries few. Mostly small farmers

or keepers of flocks, they manufacture woolen cloths, rugs, pottery, and small articles of metal. The country is rich, however, in undeveloped mineral resources. Gold is found almost everywhere. In the rivers of the north and northeastern portions handfuls of pure yellow nuggets have been picked out from the sands in a few hours. But the difficulties of transportation and heavy tribute levied by officials have prevented mining from developing on any large scale. There are no railways. Numerous trade routes connect Lhasa with China and India. Pack-trains from Mongolia bring leather and European jewelry, of which the Tibetans are exceedingly fond. From China the Tibetans buy silk, carpets, porcelains, and large quantities of tea.

The headquarters of Lamaism, the national religion, are at Lhasa, a walled city long known as "Forbidden Lhasa." The Grand Lama, or Dalai Lama, whose palace is near Lhasa, rules central Tibet through thousands of lesser priests and monks, who hold political sway. Spiritual affairs, however, are chiefly centered in the hands of the Tashi Lama, the head of a famous monastery at Tashilunpo. Lamaism is a strange combination of Buddhism, sorcery, and certain ancient Indian faiths.

THE PALACE OF THE DALAI LAMA AT LHASA

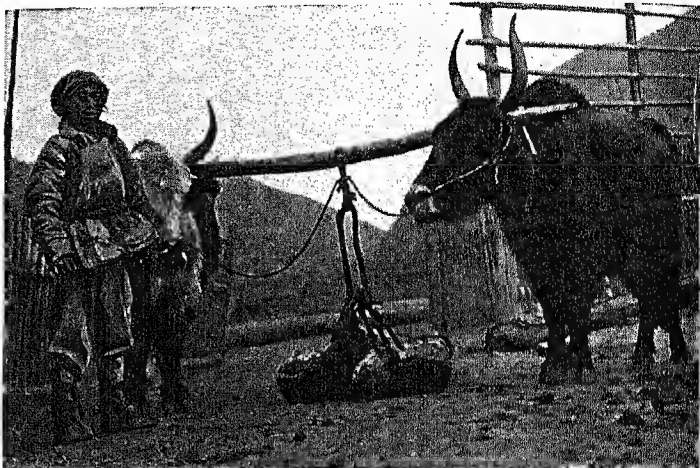


Until 1904 no foreigner had ever set foot inside the walled city of Lhasa. "Forbidden Lhasa" it was to the outside world, and many were the strange tales which were told about the mysteries of Lamaism, the national religion. But in 1904 a British expedition captured the city, and for the first time foreigners climbed the three flights of stairs and the four ladders which are the only means of entrance into the palace from which the Dalai Lama surveyed his capital city.

For centuries Tibet was a closed country to Europeans. Bold explorers who attempted to enter it were killed or driven out. A partial breaking down of the barrier came in 1904, when Col. F. E. Young-

husband led an armed British expedition to Lhasa and forced the Tibetans to discontinue hostile demonstrations against the Indian frontier. British trading posts were also to be allowed at certain points.

HOW TIBETANS GRIND THEIR GRAIN



The Yak is really a species of ox, and the Tibetans use him as their beast of burden, just as primitive peoples in other parts of the world have used the ordinary ox. Here are two yaks dragging between them a huge stone over a threshing floor. The movement of this stone, back and forth, grinds the grains of barley, the chief article of food in Tibet.

Tibet was for long a part of the Chinese Empire, paying tribute to Peking. During the Chinese revolution of 1911 the Tibetans drove out the Chinese garrisons and Great Britain refused to allow them to return. Thus Tibet today stands virtually independent, although China still claims sovereignty over it. The area of Tibet is about 463,000 square miles; population, probably about 2,000,000.

TIDE. Everyone who has lived by the ocean has noticed how the waters creep slowly up the beach for six hours, and then for six hours slip steadily down again. The connection of this movement with the moon was noted very early, but until Sir Isaac Newton's discovery of the law of gravitation the cause of this endless rise and fall of the ocean could not be explained. It is now known to be due to the pull of the moon on the earth, sometimes helped and sometimes hindered by the sun, depending upon whether these two bodies are in a straight line and pull on the earth together, or whether they pull in different directions. The moon is so much nearer to the earth than the sun that, although its mass is far less, its tide-raising force is more than twice the tide-raising force of the sun.

Whenever the moon rises over the ocean, it tends to heap up the water under it. So a great wave, or tide, is started traveling across the wide sea, making high tide. Then by reason of the earth's movement

in 24 hours and 51 minutes). At the same time that the moon lifts the water on the side nearest it, it pulls away the earth from the water on the opposite side, which causes another heaping up of water at that point.

WHAT MAKES THE TIDES?

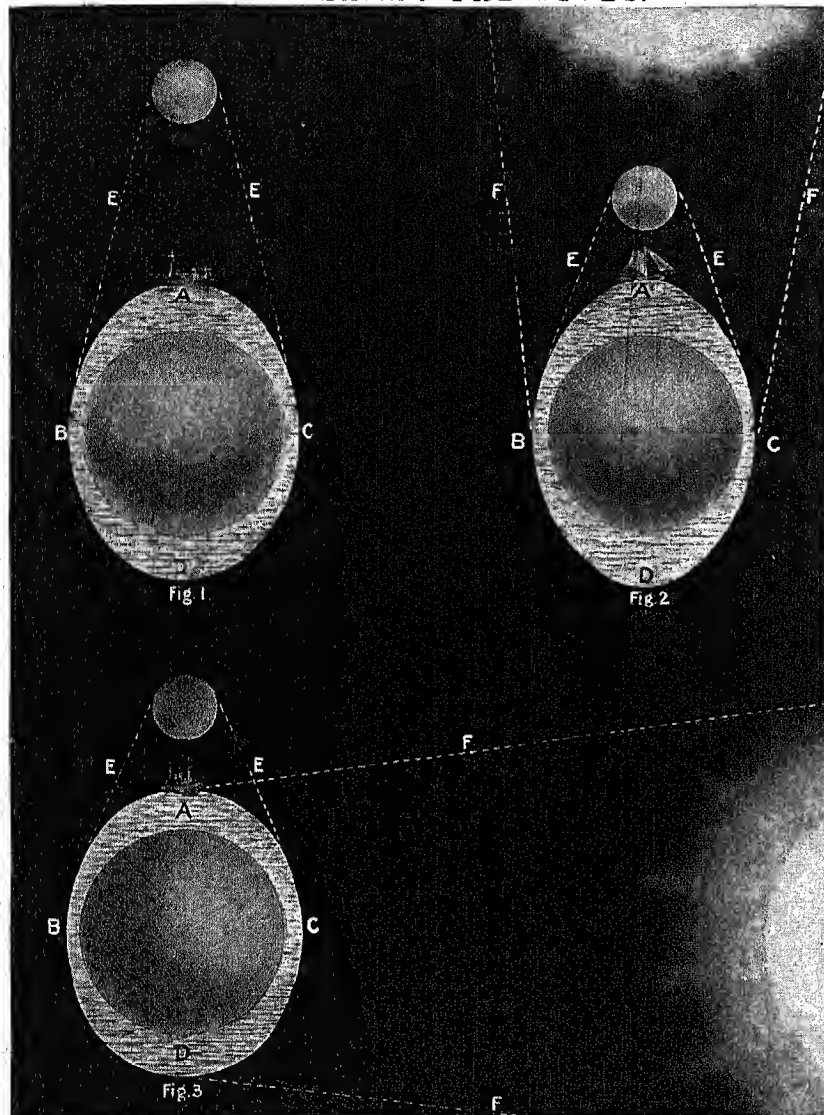


Fig. 1 shows how the moon causes tides. The pull of gravitation between earth and moon, acting in the zone EE, piles up water into a high tide at A, leaving low tides at B and C. The waters at D, being farther from the moon, are left behind, so to speak, and form an opposite high tide. Fig. 2 shows the very high "spring" tides created when sun and moon are in line. The pull of the sun, acting in the area FF, is then added to that of the moon. Fig. 3 shows the "neap," or scanty, tides which occur when moon and sun pull at right angles to each other. The tides are here shown as though they occurred in line with the centers of earth and moon, but in reality there is considerable lag. For example, the high tide at A, Fig. 1, would not take place until A had passed well beyond the earth-moon line.

the moon is left far behind, and the water goes back to its own level.

This is called the "direct" tide. There is also the "opposite" tide, which occurs at the same time on the opposite side of the earth. That is why we have two high tides in every 24 hours (or, more exactly,

two to three feet, while on the shores of great continents, especially in gradually narrowing bays, the height is often very great. The average spring tide at New York is about $5\frac{1}{2}$ feet, in Boston about 11, and in the Bay of Fundy it often rises to 60 feet and sometimes more. Lake tides are too small to

be always two high tides opposite each other, and two low tides at equal distances between them.

Twice in the course of every month, when the moon is new or full, it comes into a line with the sun. At these times both attract the earth from the same direction, and the higher tides which are produced are called "spring" tides. These have nothing to do with the season of the year. "Neap" (meaning "nipped" or "scanty") tides, which occur near the first and third quarters of the moon, are low, because the sun and moon are then pulling at right angles to each other.

In the mouths of some rivers, and sometimes in sharply narrowing ocean inlets, the result of the rising of the spring tide is occasionally very picturesque. The tides overcome the current of the river, and a single high wave, moving onward like a wall of water, rushes with great violence and a roaring noise up the river bed. This phenomenon is called a "bore" or an "eagre." In one branch of the Ganges the bore travels 70 miles in 4 hours, and often appears suddenly as a wall 7 feet high, while in the mouth of the Amazon it sometimes reaches a height of 15 feet.

The extent of the rise and fall of the tide varies in different places. In mid-ocean the difference between high and low water is usually

THE CELEBRATED TIDAL BORE IN THE BAY OF FUNDY



The Bay of Fundy, a long narrow inlet of the sea between New Brunswick and Nova Scotia, so confines the sweep of the tide that tremendous tidal waves or "bores" often result. At Moncton, New Brunswick, where this photograph was taken, the normal difference between high and low tide is 30 feet: You can see the wall of water rushing toward the shore.

be noticeable, that of Lake Michigan being less than two inches; and in landlocked seas like the Mediterranean the tides are also very slight.

A knowledge of tides is very important to the navigator, as the question of a foot or two in depth on a dangerous shoal may involve the lives and property on the ship. Governments therefore furnish tables showing the fluctuations at all important ports for every hour and every day for as much as a year ahead. These are calculated by complicated machines called "tide predictors."

Many men have puzzled over the problem of how to utilize the tremendous energy created when the moon lifts and lets fall these billions of tons of water twice each day. If this power could be harnessed it could run all the factories without using an ounce of coal, all the railroads, trolleys, subways, and electric automobiles, and produce all the electric light. Up to this time, however, no practical scheme has been devised. One plan proposed is to build enormous basins where the tide rises high. The tide would flow into these basins twice a day, but the water would be allowed to escape only through tunnels containing turbines similar to those at Niagara. While this plan is probably practicable, the great expense connected with building and operating such a plant has prevented its construction.

TIENTSIN (*tsh'nts'n'*), CHINA. Few shipping centers have so poor a natural harbor as Tientsin, yet this city 40 miles inland on the Pei River is a world port—for it is the gateway to the vast agricultural plain of northern China. Only small craft can enter the shallow, silted harbor. Large vessels must unload at Tangku on the Gulf of Chihli, or stand out to sea before Taku Bar. Cargoes are freighted or lightered up the twisting Pei Ho. In winter the river must be opened by icebreakers or cargoes brought in from the ice-free port of Chinwangtao to the northeast.

But once in Tientsin, it is easy to see why shippers take all this trouble, for Tientsin is the hub of a network of routes to the productive interior. The navigable Pei Ho connects Tientsin with Peiping, about 80 miles northwest; the Grand Canal links it

with Hangchow and the Yangtze. Also spreading from the city are railroads, highways, and caravan routes. From the numerous farms, villages, and grazing grounds of the fertile plain come cotton, hides, bristles, furs, peanuts, and especially wheat and wool.

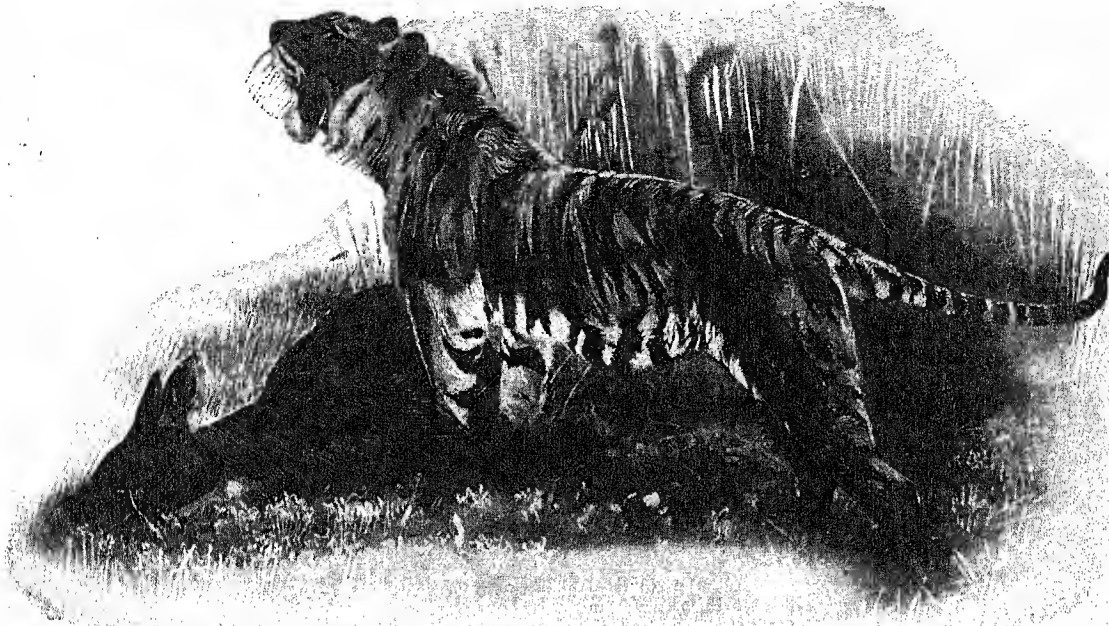
As the trade center of Hopeh province and northern China, Tientsin has been a prize of war. In 1860 it was seized by England and France, and was opened to world trade by the Treaty of Tientsin. European nations and Japan established "foreign concessions," and the city became one of the most modern in China. During the Boxer Rebellion of 1900, the foreign quarter was besieged for 27 days until it was relieved by United States Marines and the allied forces. Little more than a generation later, in 1937, Tientsin was seized by Japan and cut off from independent China. Population, about 1,000,000.

TIGER. Upon the African continent the lion reigns supreme, sole monarch at least over his own feline race; but in Asia his sovereignty is disputed by a gaudily dressed cousin, the most formidable member of the cat tribe. Majestic as the lion appears when viewed full face, with his great bushy mane, he lacks the agile strength of his near relative. The tiger is larger, stronger, quicker, more graceful, and has great cunning. He is also the most perfect and beautiful of his race, owing to the bright coloring of his coat, his liveness, and graceful proportions. The stories of hunters conquering lions single-handed have no parallel in the history of the tiger; for no man, however well trained and armed, is a match for the tiger on foot. His terrible perfection has inspired the poem by William Blake beginning—

Tiger, tiger, burning bright
In the forests of the night,
What immortal hand or eye
Could frame thy fearful symmetry?

Asia is the home of the tiger. It is not found on any other continent. The Royal Bengal tiger of India is best known, but a larger, though less fierce, variety is found in Siberia. It has a much heavier and warmer coat of fur than its southern relative. The coat of the Bengal tiger has a ground color of tawny yellow with

THE TYRANT OF THE ASIATIC JUNGLE



No beast disputes the rule of the Royal Bengal Tiger of India. It is the fiercest of the cat family, and the largest and most powerful of the great cats, surpassing the lion. The Tiger haunts woods and dense thickets, where its black-striped tawny hide makes it almost invisible. By day it usually hides in the jungle, but at night it roams around in search of prey. Unlike the lions the Tigers are solitary beasts, preferring to wander alone. Here you see one of these master-cats and its victim, an antelope. The Tiger is not particular about his diet, but will prey on almost any living animal it happens to find.

black stripes on the body and limbs, the tail also being ringed with black. This coloring makes it very difficult to see a tiger in a thicket of reeds or dried grass. The largest tigers are about 11 feet from the nose to the tip of the tail and weigh about 500 pounds.

The chief difference between the tiger and the lion is in the coloring of their skin and the fact that the tiger has no mane. The skeletons of the two animals are almost identical. In habits also they are much alike, except that tigers, unlike lions, rarely hunt in pairs. Tigers are also good swimmers, which is unusual in the cat family, and if hard pressed will occasionally climb trees. They prefer to hunt at night by stalking their prey, but also prowl about in the daylight. They prey upon all varieties of wild animals and destroy a large number of cattle, horses, sheep, goats, and other domestic animals. A cattle-eating tiger will kill an ox about every five days, or from 60 to 70 a year. Unless it is cornered or greatly provoked the tiger avoids the elephant, and it rarely attacks a large buffalo or bear. In encounters with these animals the tiger is frequently worsted. It is said that when a tiger once tastes human blood it becomes a confirmed man-eater, preferring human flesh to all others. Man-eating tigers are greatly feared by the natives of India. One case is recorded in which a single tiger killed 127 persons in a single year. On an average 1,000 people are killed annually by tigers, mostly in India. The young tigers are far more destructive than the old ones.

In some respects the tiger is cowardly; it will eat carrion rather than attack a foe that is capable of making a successful defense. In its search for prey and its efforts to avoid hunters, it is cunning and bold. In its native wild state it is the most blood-thirsty of beasts, and in captivity it is treacherous.

Tiger kittens number from two to five in a litter, but more than two are rarely raised. The young remain with the mother till the third year, while she teaches them to hunt. Scientific name of Royal Bengal tiger, *Felis tigris*.

TIGRIS (*tigris*) RIVER. This great river of western Asia rises in the mountains of Kurdistan, south and west of Lake Van. It is joined at Til by the Bitlis, unites with its sister stream the Euphrates at Korna, and from this point to the Persian Gulf is known as the Shatt-el-Arab. Its whole course is some 1,150 miles long. In its upper part it is a swift stream, and because of the tributaries which it receives from the east, its volume is greater than that of its companion stream the Euphrates. The Tigris in ancient times was the great river of Assyria and Babylonia. Nineveh, Seleucia, and Ctesiphon stood on its banks. Its chief cities now are Basra, Bagdad, Mosul, and Diyarbekir. It is navigable for steamers at all seasons below Mosul. Germany's plans to control the fertile lands of Mesopotamia ("the land between the rivers"), which under irrigation can again be made enormously productive, was one of the contributing causes of the first World War. (See Mesopotamia.)

HOW the WORLD Gets Its TIME

TIME. Our clocks and watches "tell the time" in hours and minutes, but actually the most important measures of time are the day and the year. These great natural units are fixed by the motions of the earth, and no power on earth can change them. In contrast, hours, minutes, and seconds are man-made divisions of the day, just as weeks and months are man-made divisions of the year. We can fix these to suit ourselves. Therefore the story of keeping time tells *why* men make these divisions, and *how* they keep track of them with clocks, watches, and other devices.

To keep accurate track of the year, and also of weeks and months, we *count* days (see Calendar). To make this count, and also tell time within each day, we must know when each day begins and ends.

Telling Time from the Sun and Stars

Since our days are given us by the rotation of the earth, we can count a day from the time when the sun is in a certain position in the sky until it reaches the same position again. A convenient instant for doing this is noon, when the sun is highest in the sky. At this time it is also on the north-south line, or meridian, through the observer's position. Then it is easy to check the position of the sun with a transit telescope, set along this line. Other checking devices are sundials, and sticks or posts set to mark a north-south shadow.

The length of time from one noon position of the sun to the next is called an *apparent solar day*. Unfortunately this day is not a satisfactory unit of time because it varies in length for reasons explained elsewhere (see Day). Therefore we use the average span from noon to noon (or midnight to midnight) and call it a *mean solar day*. This permits clocks to run throughout the year at the same rate of 24 equal hours a day.

Time can be fixed directly from the stars because, unlike the sun, the time at which a star passes across a meridian does not vary throughout the year. Apparent solar time, obtained from observations of the sun, can be converted into mean solar time or star time by using a formula called the *equation of time*.

Adjusting Time around the Earth

The due south position of the sun, or of any star used for time telling, moves westward one-fourth of a degree in every minute. At the latitudes of New York City and Chicago this amounts to about 13 miles. Hence, when it is noon by *local time* in any one place in these latitudes, it is one minute after noon 13 miles east of the place, and one minute before noon 13 miles to the westward.

If everybody used local time, transcontinental travelers would have to change their watches every few miles, and traveling would be hopelessly confused. To avoid this, most civilized nations have established *time zones* about 15 degrees wide (one hour in time). In each zone the time is fixed for a central meridian and used throughout the zone. Thus travelers need

only change their time by one hour as they pass from zone to zone. In North America, the zones are based on the following meridians:

Atlantic—60° W., passing west of Newfoundland.

Eastern—75° W., passing through Philadelphia.

Central—90° W., passing almost exactly through New Orleans and East St. Louis.

Mountain—105° W., passing almost through Denver.

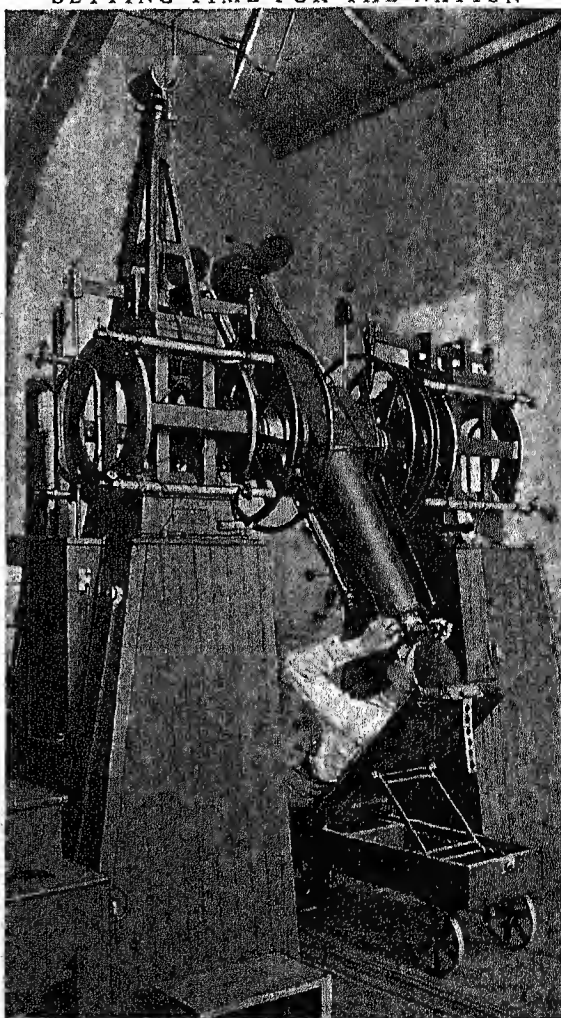
Pacific—120° W., passing near Carson City, Nev., and forming the eastern boundary of California in the north.

Yukon (Canadian)—135° W., passing near White Horse.

Alaska—150° W., passing near Anchorage. (For a map of the time zones in the United States, see United States.)

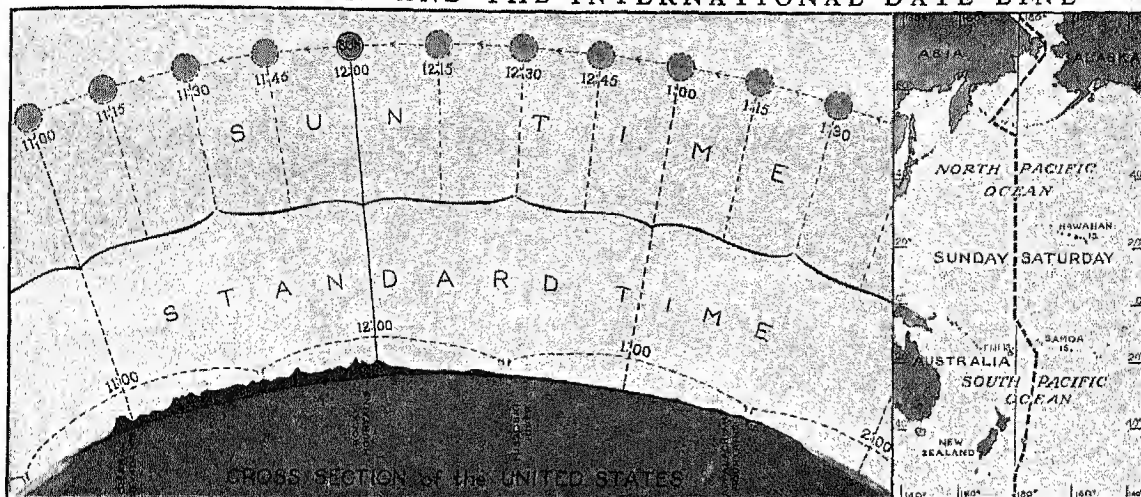
When time is kept according to this zone system, it is called *standard time*. Throughout the United States and its possessions, standard time can be set in any locality by checking with time signals sent

SETTING TIME FOR THE NATION



Here an astronomer in the Naval Observatory in Washington, D.C., is determining the correct time. To do so, he uses a transit telescope, an instrument set accurately to observe the passage of stars across the north-south meridian. The stars tell the exact time, and telegraphic and radio signals carry the information far and wide for use in correcting clocks and watches.

STANDARD TIME AND THE INTERNATIONAL DATE LINE



Here you see how the United States is divided into four standard time zones, represented by the dotted curves near the ground. Each of these zones uses as its "standard" time the sun time of the meridian which passes through its center. Thus, for example, the clocks all through the Mountain zone indicate 12 o'clock when it is precisely noon by "mean solar time" at Denver, though the actual mean solar time for various places in the zone ranges from 11:30 to 12:30. So all the places in each of the other zones observe the standard time of their central meridians, disregarding their actual sun time, shown by the dotted circles in the upper division of this diagram. The map at the right shows the International Date Line, that imaginary line through the Pacific where you can go from today to yesterday, as the text explains. Notice how it swerves from the 180th meridian to avoid cutting through the eastern tip of Asia and certain groups of islands.

from the Naval Observatory at Washington, and distributed by telegraph companies and by several naval radio stations.

By setting clocks at noon when it is really only 11 a. m. by standard time, sunrise and sunset can be made to come one hour later by the clock. This is known as "daylight saving" and has been adopted by many American cities (see Daylight Saving).

Where the Date Changes

Now suppose we follow the "time zone" system around the earth. When it is noon in Greenwich, England—Greenwich is used because it is the center of world-wide time—of say the 15th of April, it is only 7 a. m. in Washington. In San Francisco it is only 4 a. m., while in the time zone in which the Samoan Islands lie, it is midnight. That is, the 15th, which is half gone in Greenwich, has only commenced in Samoa.

If now we go east from Greenwich, when it is noon in the British Isles it is already 2 p. m. in Leningrad, 5:30 p. m. in Madras, India, and so on, until in the time zone marked by the Fiji Islands, just west of Samoa, the 15th would be within an hour of changing to the 16th. Thus, when it is noon at Greenwich, there is a line between Samoa and the Fiji Islands on one side of which the 15th of April would be just beginning, and on the other side it would be just ending.

That is why ships gain or lose a day when they sail around the world. Thus, suppose a ship is approaching Samoa from the Fiji Islands at 11:59 p. m. on the night of the 15th. Ten minutes later it "crosses the line"—and its time is now nine minutes after midnight on the morning of the 15th! That is, it has spent the 15th in sailing east toward Samoa—and now it has the 15th to use all over again!

If it were going west, it would lose a day. That is, just before crossing the line, it would be in the beginning of the 15th; while a few minutes later, after crossing the line, it would find itself in the early morning of the 16th.

This imaginary line where the date changes in this way is called the "international date line." Being opposite Greenwich on the other side of the world, it cuts almost midway through the Pacific, where the change of date causes the least possible difficulty. In some places it deviates from the 180th meridian to avoid passing through land areas.

Different Ways of Telling Time

The usual division of the day into "a. m." (ante meridian) and "p. m." (post meridian) groups of 12 hours each has given way for some purposes to the "24-hour" day in many countries. On the "24-hour" clock the hours begin with zero at midnight and run to 23; thus 1:30 p. m. is called 13:30 o'clock, and so on. This system is in general use on the railway systems of continental Europe. Since it is simpler than the 12-hour system and makes calculation easier, astronomers and navigators use it for tables and records.

On shipboard two varieties of time are used. "Greenwich time," or time corresponding to that at Greenwich, England, is kept by an accurate chronometer for use in determining the ship's position (see Latitude and Longitude). The ship's routine, however, is governed by "watches" and "bells." The day is divided into six "watches," commencing at noon, and each watch is divided into eight parts, marked by "bells." One-half an hour after a watch begins, "one bell" is struck. A half-hour later, or one hour after the commencement of the watch, "two bells" strike, and so on up to "eight bells,"

TIME ALL OVER THE WORLD



Here you can see how the world would look if you drew on it the imaginary lines which mark the standard time zones. All standard time is based on the time at standard meridians drawn 15 degrees apart beginning at the Greenwich Observatory near London, England. The picture shows the standard time all over the world when it is noon at Greenwich.

when the watch changes, and the bells strike all over again from one to eight. Under this system, noon, four p. m., eight p. m., midnight, and four a. m. are "eight bells," with the other hours and half-hours corresponding. "Clock time" is also kept on passenger liners and corrected every noon to allow for the ship's position. In the United States navy, as in the navies of most European nations, time is kept on the basis of standard time zones like those used on land.

Another method of calculating time, used by astronomers, is "sidereal time." The day of sidereal time is the period of one complete revolution of the earth

upon its axis, and is determined by measuring the transit of fixed stars. The sidereal day contains 23 hours, 56 minutes, and 4 seconds of mean solar time, and begins at noon. (*See also* Calendar; Day; Month; Watches and Clocks; Week.)

Time, in music, means the division of a measure into the fractional parts of a whole note. It is usually indicated by a fraction, as $\frac{2}{4}$, $\frac{3}{4}$, placed immediately after the clef at the beginning of a piece or a movement. Common time (C) is sometimes indicated by C. In such fractions the lower number indicates the kind of notes to be used as time standards, while the upper figure shows how many make up a single bar.

LITTLE TALKS ON GREAT THINGS *by Arthur Mee*

THE VALUE OF TIME

IF ALL the natural gifts of life, time is the most precious, for upon time the use of other gifts depends. It is said that Queen Elizabeth, when she lay dying, offered her kingdom for a moment of time; but there was no wise man in all the land who could give her that. But you and I have thousands and millions of these moments, and we waste perhaps thousands of them.

There are people who are thrifty with money, who throw away golden moments as if they were of no value. Yet moments are golden things; for time, which we all share alike, whether we are kings or beggars or ordinary people, makes up our lives, and every bit of time we waste is a bit of wasted life. A moment is here, and then gone, forever.

We need not fear to be idle, for what we call an idle hour may sometimes be the best medicine we could take. It is not the hour that is properly idle that we shall ever come to regret; it is the hour upon hour, making day upon day, week upon week, of time given up to useless or even harmful amusements that we shall sigh for when sighing is in vain. Any one of us may look around and see two men we know, one with all the advantages of education, all the happiness of prosperity, all the influence of position; the other living a humdrum life without distinction of any kind. All over the world we can find people in pairs like this, and the whole of the difference between them lies in the way in which they use their time. It would be easy to go through a list of the world's great men, the men who have helped mankind along, and to show that they prized time more than anything else they possessed.

Long before you are old you will come to regret the time you wasted in your youth; but there is one thing you will never regret—you will never regret the time you gave to your books, and the attention you gave to your teacher. Men grow rich by using their money so that it brings them good interest, so that one dollar grows into two, and two into four; but nothing pays such good interest as the hours that a wise boy spends at school or with his books at home, and if there are any hours a man would like to call back again, they are those golden hours which you can call yours

today, but which all too soon will be gone, never to return.

Use them well, for they are the hours in which you are making your name in the world. There was a man who saved a million lives. Before we were born he began to think about a great problem that was puzzling the doctors, and he had almost everyone against him. Hardly anybody believed in him. But he was in earnest, and he stuck to his work, and he went on thinking, thinking, thinking, until at last there came to him a great idea which has been a blessing to every suffering creature who has ever passed through an operation, and must have saved at least a million lives. And this splendid man, Joseph Lister, did this by saving his moments.

Thomas Carlyle, the great English writer, left only a few poems among the prose works that have made him famous; but one of these comes into our thoughts whenever we think of time. This is what it says:

So here hath been dawning
Another blue day;
Think, wilt thou let it
Slip useless away?

Out of Eternity
This new day is born
Into Eternity
A night doth return.

Behold it aforetime
No eyes ever did;
So soon it forever
From all eyes is hid.

Here hath been dawning
Another blue day;
Think, wilt thou let it
Slip useless away?

Think of a minute and all it may mean! You may make yourself immortal in it; you may give the world some great idea, invent some new thing, discover some great piece of knowledge, lift up some sad heart; or you may throw it away as if it were nothing, wasting this time which is the very gold of the world; or you may do even worse than that—you may use it meanly and ignobly, sowing the seed of misery and ruin through many lives. Time's hands scatter treasures generously for us all. We pick them up, or we leave, and according to our choice, so is our life.

TIN. The largest use of this metal is in coating steel to protect it. The billions of tin cans we use every year are made of tin plate because tin resists food acids. A coat of tin less than one-half of one-thousandth of an inch thick is enough for this purpose. Steel sheets for cans are plated by passing them through a bath of molten tin.

Kitchen utensils and other articles requiring thicker coatings are electroplated (*see* Electroplating). Terne plate, used chiefly for roofing and other building purposes, is made by immersing sheets of steel in a molten mixture of lead with 15 to 25 per cent of tin.

Tin enters into many alloys, such as bronze, babbitt and other bearing metals, type, solder, pewter, and the low-melting-point alloys of which fuses are made (*see* Alloys). Alloys of tin are used to make collapsible tubes such as those for tooth paste. Tin chloride is used in dyeing and weighting silk.

Pure tin is white with a bluish tinge. With a specific gravity of 7.3, it is heavier than zinc. In hardness it is between lead and gold. The melting point is 449° F.; boiling point, 4,100°; chemical symbol, Sn; atomic number, 50; atomic weight, 118.70; valence, 2 and 4.

The chief ore is cassiterite or tinstone, a dioxide of tin. Before smelting, it is crushed to a powder and roasted to remove arsenic and sulphur. At the smelter, it is heated with carbon to separate the tin from the zinc, copper, bismuth, and iron that it contains. Tin is also refined by electrolysis. The refined product is called "block tin."

The Malay States lead in tin-ore production, followed by Bolivia and the Netherlands Indies. Siam (Thailand), Nigeria, China, Belgian Congo, Australia, Burma, and England yield commercial quantities.

Although the United States is the world's largest user of tin, it has no important deposits. Alaska, the chief domestic source, produces but little. Most of its imports of refined tin come from smelters in Singapore, England, and the Netherlands Indies.

When the second World War threatened to cut off supplies of this "strategic material," the United States in 1941 erected at Texas City, Tex., its first large-scale commercial tin smelter, to produce tin from the low-grade ores of Bolivia. Smaller tin

smelters built in the United States had failed because it was cheaper to buy refined tin from abroad than to produce it from imported ores.

The use of tin in the form of bronze, an alloy of tin and copper, began thousands of years ago (*see* Bronze). Since deposits of this metal were hard to

find, it became an important factor in early commerce. To get it, the Phoenicians sailed from the Mediterranean as far as the mines of Cornwall in distant Britain.

TITIAN (*tish'an*) (1477-1576). The old artist laid down his brush and gazed dreamily at the masterpiece before him in which he had just marvelously revealed the golden splendor of 16th-century Venetian life.

"I think," he said simply, "I am beginning to learn something about painting."

It was Titian who spoke—Titian, the great Venetian painter who at the age of 98 was still painting, and who during his long life of industry, success, and honor produced more than 600 pictures, glowing miracles of color, many of which

today are numbered among the greatest art treasures of the world.

The great artist, whose Italian name was Tiziano Vecellio, was born at Cadore, in the Alpine region north of Venice. When just a little boy of ten he left his mountain home—where, legend tells us, he used to paint with juices extracted from flowers—and went to study painting in Venice. There he worked in the studios of Giovanni and Gentile Bellini, where the artist Giorgione was a fellow pupil.

Titian's pictures soon brought him fame, riches, fine friends, and many honors. In 1513 he became superintendent of government works, which office brought him a comfortable income. In return he was to complete certain great works begun by Bellini and paint the portraits of the Venetian doges or rulers, as they succeeded one another in office. He was a handsome man of courtly manners, who soon associated on terms of comparative equality with dukes and kings and princes of the church. His portraits of these famous men are among his greatest works. His first portrait of Charles V so pleased that great emperor that Titian was made a count and Knight of the Golden Spur, while Titian's children

MALAY GIRLS "PANNING" TIN



In the Malay States, which furnish one-third of the world's tin supply, the metal is found for the most part in alluvial deposits. The simplest way of recovering the tin ore is by "panning" the "pay dirt," as these sturdy Malay girls are doing. Usually, however, the ore-bearing soil is washed in machines or run over sluices. Tin also is secured by underground mining.

were raised to the rank of nobles of the empire. Meanwhile the artist was producing many great works of religious and mythological subjects. Among the most famous of these are 'The Assumption of the Madonna', 'Christ and the Pharisee', 'Bacchus and Ariadne', 'The Entombment of Christ', 'The Supper of Emmaus', 'Venus Anadyomene'.

In 1530 at the death of his wife, Titian established himself in a beautiful new home on the sea at one end of Venice, where he was the center of a famous artistic and literary circle, joined even by kings. Here, at the age of 99, he fell a victim to the terrible plague which at that time killed 50,000 persons in Venice. He was buried with honors in the church of Santa Maria de' Frari.

Titian is looked upon as the greatest color artist of all time. In his fine portraits of emperors, queens, popes, doges, and fair women, his gorgeous church pictures glowing with exquisite harmonies of color, and his serene enchanting pagan deities amid their beautiful nature settings, he revealed the glittering pageantry of 16th-century Venice, that luxury-loving city of palaces, domes, and marble porticoes, dreaming in golden splendor beside the blue Adriatic.

TITLARK. The pipit, as the American titlark is commonly called, is a "near-lark." In its plumage of streaked brown, as in its habit of singing on the wing and of nesting on the ground, it closely resembles the lark family.

Over 50 species of pipits, with the wagtails, make up the family *Motacillidae*, and occur in all parts of the world. Two species are common in the United

States. The pipit, $6\frac{1}{2}$ inches long, is found in open country and wet fields. It feeds mainly on worms and insects. Its repeated call, *pipit, pipit*, has given its name. In the fields or prairies flocks of hundreds are

often found running on the ground. (For illustration in color, see Birds.) Sprague's pipit, because of its lovely song while on the wing, has been given the name of "Missouri skylark." Scientific name of common American pipit, *Anthus rubescens*.

TITMOUSE. Orchard owners largely depend for a successful fruit crop on the help of the active little titmouse. When trees are bare and sprayers rest from their war against the insect menace, these little experts get in their best work. They search every crevice for hibernating insects, and the larvae and eggs from which harmful insects hatch. Then, when spring brings out the fruit blossoms, the wise titmouse knows which bud contains the harmful grub, and fruit growers have learned that these are the buds the birds destroy. So sprightly, bold, and inquisitive are they that one writer calls them "feathered interrogation points."

The plumage of the titmouse family (*Paridae*) is never spotted, barred, or streaked. Plain colors are the rule, generally

gray, olive green, or brown above, and lighter shades underneath. Some species, notably the chickadees, have caps of contrasting color (see Chickadee). All have short cone-shaped bills. Some species are crested. Though classed as song birds, they are not necessarily singers, but all have cheery musical call-notes. As a rule they do not migrate, though they roam widely in search of food. They are found

'THE ASSUMPTION OF THE MADONNA'



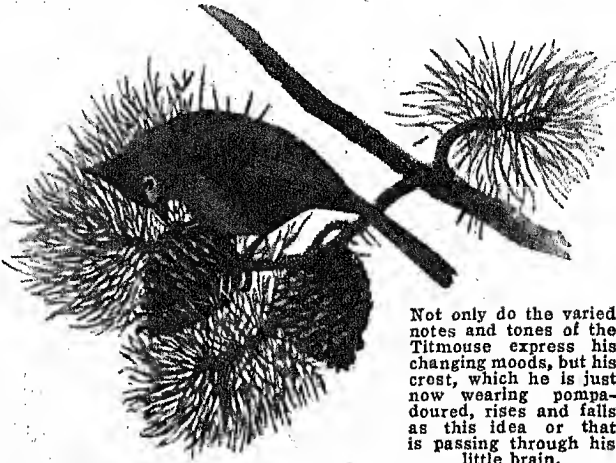
This painting, now in Venice, is regarded as Titian's masterpiece. When Napoleon was carrying off art treasures from Italy to Paris, this picture was blackened over with candle smoke so that the French Commissioners would not consider it worth taking away; and so it remained in the possession of the land that gave it birth.

throughout almost the whole world, most abundantly in the Northern Hemisphere. They nest in hollow trees or stumps. The eggs, six to eight in number, are white, slightly marked with reddish brown or rust color.

Of the 100 species, but 30 are found in America. Of these the tufted titmouse, commonly called tomtit, is a general favorite. This bird is six inches long, slate gray above, white and reddish beneath, with a pointed crest that adds to its pert appearance. It is found in the eastern United States, as far north and west as Nebraska, and south through the Gulf states. Tomtits line their nests with hair, and the saucy little birds go to all lengths to get it. One was once observed to obtain her lining from a red squirrel, stretched at length on a tree limb. She approached cautiously from behind and caught at the tail, till she had a mouthful of hairs, which she

then carried to a nearby hole in a tree. Another instance is related of a titmouse alighting on the head of a man, seizing a beakful of hair, bracing herself on her stout little legs, and actually jerking out the lock.

LITTLE MR. TITMOUSE AND HIS CREST



Not only do the varied notes and tones of the Titmouse express his changing moods, but his crest, which he is just now wearing pompadoured, rises and falls as this idea or that is passing through his little brain.

The bush-tit is but $4\frac{1}{2}$ inches long, brown-drab above, brown-white beneath. Its nest, as remarkably large as the bird is small, is a gourd-shaped affair, from eight to ten inches long, made of leaves and moss, with a soft lining of spiders' webs and feathers. The entrance is from the side. These birds are found on the western slope of the coast mountains of Oregon to Lower California.

Of the Old World titmice the more common forms are the great titmouse and the crested titmouse of Europe, and the blue-capped titmouse of Asia. Scientific name of tufted titmouse, *Baeolophus bicolor*; of bush-tit, *Psaltirparus minimus*.

The LIFE STORY of the COMMON TOAD

The Differences Between the Toads and Their Cousins, the Frogs—How the Males Sing with Their Mouths Closed and How the Females Lay Their Eggs in Long Ropes—Some Toads of Foreign Lands



TOAD. Springtime breaks the long winter sleep of the toad, sluggish cousin of the frog. He stirs in his cozy niche under clods or stones, then half crawls, half hops into the spring sunlight, which catches glints of gold, amber, and jade in his protruding eyes.

The common American toad, when full grown and perhaps 25 years old, may be three and a half inches long. His skin is rough, with prominent warts. He is brownish-olive in color, usually with some darker spots, and with a yellowish streak down the middle of his back.

He is different from the frog in many ways. His jaws are toothless, for he lives mostly on creatures

that he can swallow at one gulp. His legs are shorter and only when he is frightened will he take a full leap. He spends most of his life on land; and so his feet are not as fully webbed for swimming as are the frog's feet.

In summer the toad sits and sits, his sides getting fatter as he fills his stomach completely four times in 24 hours, with insects that he captures by flipping out his sticky tongue so fast the eye can scarcely detect it. He may swallow alive nearly 10,000 insects in a season, and he may be worth \$20 as a garden protector. Besides slugs, beetles, flies, mosquitoes, crickets, cutworms, plant lice, and sugar-beet worms,

he relishes earthworms. These give the toad a real battle. With his forefeet, he wrestles the worms inch by inch into his muzzle and then swallows them whole.

When alarmed, the toad puffs out his body until the skin is taut. Like other tailless amphibians (animals that live on both land and water), the toad has active glands in his skin from which a milky, acrid secretion oozes when he is roughly handled. A dog will promptly drop a toad from his mouth. The acrid secretion will not hurt a human being unless he gets it into his mouth or eyes. The belief that you can catch warts from a toad is a superstition.

The Song of the Toad

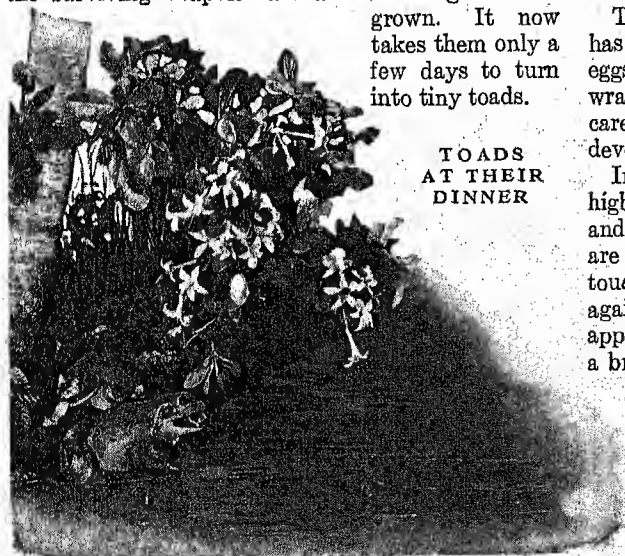
During the hot days of May or early June (April in the South), the toad moves with many others of his kind to some quiet pool and serenades the females. They are larger than the males, and they cannot sing. Their brilliant eyes showing from the water, they listen as the male fairly bursts with song. His resonating vocal sac swells up several times the size of his head, for he keeps his mouth and nostrils closed while the air is driven back and forth between lungs and mouth.

The Eggs and the Tadpoles

After a few days, the female lays her eggs, often thousands at a time, in shallow, quiet water. The small black eggs are arranged like strings of beads in long double cords of clear jelly. In two or three days if the weather is warm, and a week if it is cool, the toad eggs hatch out into small stumpy tadpoles. These are much smaller and darker than the tadpoles of the frog but they have a similar life history (see Frog). Fish, water-beetles, crayfish, turtles, and herons are waiting to eat the tadpoles, and only a small proportion of them reach maturity. In four to six weeks, the surviving tadpoles are an inch long and full

grown. It now takes them only a few days to turn into tiny toads.

TOADS AT THEIR DINNER



In the cool shade by the side of the pond these toads are collecting their food as it passes by. Mosquitoes, flies, beetles—anything that flies or creeps is welcome. They do not have to work hard, for their tongues are long and are fastened to the front of their lower jaw. A flip of this tongue and the insect is glued on its sticky tip.

The new toads, who have shrunk to about the size of a kernel of corn, leave the water and go hopping away in search of mosquitoes and other small insects. By day, the little toad hides from his many enemies—snakes, crows, hawks, chickens, and ducks—as best he can. At night, he comes out to eat and to migrate farther and farther from his home pool. By fall his body is again an inch long. Then he goes to sleep for the winter. When he is about three years old, he makes his first trip to a pool for the annual serenading and egg-laying.

Many persons find toads interesting pets. Others like to watch the change from egg to tadpole to toad. A few dozen of the eggs can be placed in a shallow dish full of water, with some pond mud on the bottom. After the tadpoles are hatched, pond scum should be added occasionally to feed them. When the tadpoles are an inch long, a miniature landing place should be provided so that they can come up and finish developing into toads. After this takes place, they must be transferred to a covered cage.

Toads are found not only on all the continents (except the Antarctic) but on many islands as well. Some 30 kinds live in the United States, but most of them are found in only a few places. The so-called "horned toad" of the desert regions of the Southwest is not a toad, but a lizard (see Lizards).

Some Odd Habits of Toads

In northeastern South America is the huge, flat Surinam toad, which has no tongue and spends its life in the water. When the eggs are laid, the male distributes them evenly over the back of the female, and under each egg a deep pouch forms in the skin to hold it. Within this cavity, the egg develops through the tadpole stage; then the young one, fully changed into a toad, swims away from its mother.

The female of the midwife toad, a European species, has no further responsibilities after she has laid her eggs. The chains of eggs are taken by the male and wrapped around his legs and thighs. He assumes the care of the eggs during the entire three weeks of their development.

In Colombia, the Indians use the secretion of a highly colored toad in "dyeing" parrots. The blue and green feathers on the neck of the Amazon parrot are plucked out, and the bare skin of the bird is touched with the skin of a living toad. This is repeated again and again after the young feathers begin to appear. When the feathers at last grow in, they are a brilliant yellow instead of green.

The Orientals use toadskins in making small articles such as purses. In Chinese medicine various parts of the toad are used for compounding prescriptions.

Toads, together with frogs and salamanders, belong to the class of backboneed animals known as *Amphibia*. Scientific name of the common American toad, *Bufo americanus*. *Bufo lentiginosus*, which closely resembles it, is the species most plentiful in the Southern states. Scientific name of the Surinam toad, *Pipa pipa*; of the midwife toad, *Alytes obstetricans*.

The WIDE REALM of 'LADY NICOTINE'

A Gift of the New World, It Now Covers 5,000,000 Acres of the Earth's Richest Soil—How Sir Walter Raleigh's Servant Screamed for Help when He Saw His Master "Drinking Smoke"—Preparing the Leaf for Market

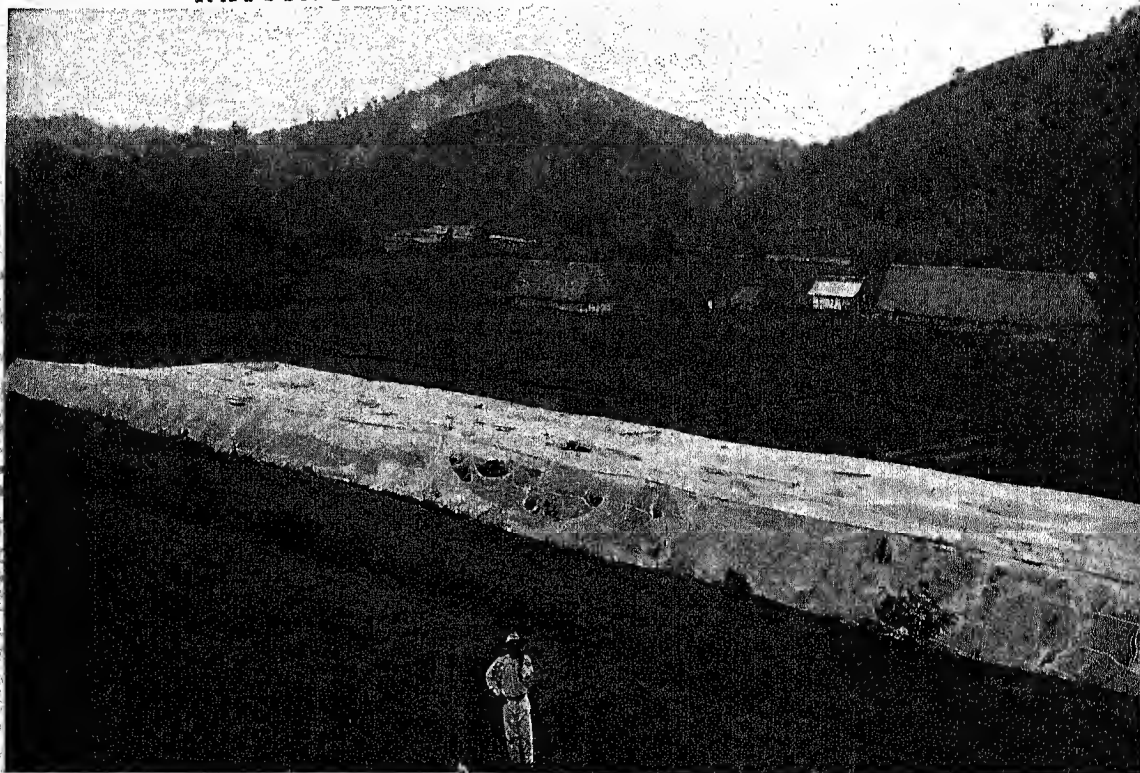
TOBACCO. A servant of Sir Walter Raleigh, so an old story tells us, one day saw clouds of smoke rising around his master's head. Startled at the sight, he dashed the contents of a tankard over Raleigh and ran screaming for help. This was the first time he had ever seen anyone smoking, for the use of tobacco, so common today, was unknown in Europe until the discovery of the New World.

The earliest explorers of America found the natives using the tobacco leaf for smoking, chewing, and even

believed that its effects were very harmful, even to adults, and on this point opinion is still divided, although the use of the "queen herb of the rude barbarian," as it is described in Chinese, has steadily increased until there is scarcely a people or tribe in existence which does not use tobacco.

The tobacco industry is of vast economic importance. Tobacco was long the chief export of the American colonies, and was the principal crop in several of them, even serving as currency. Today

RAISING TOBACCO UNDER CHEESE-CLOTH



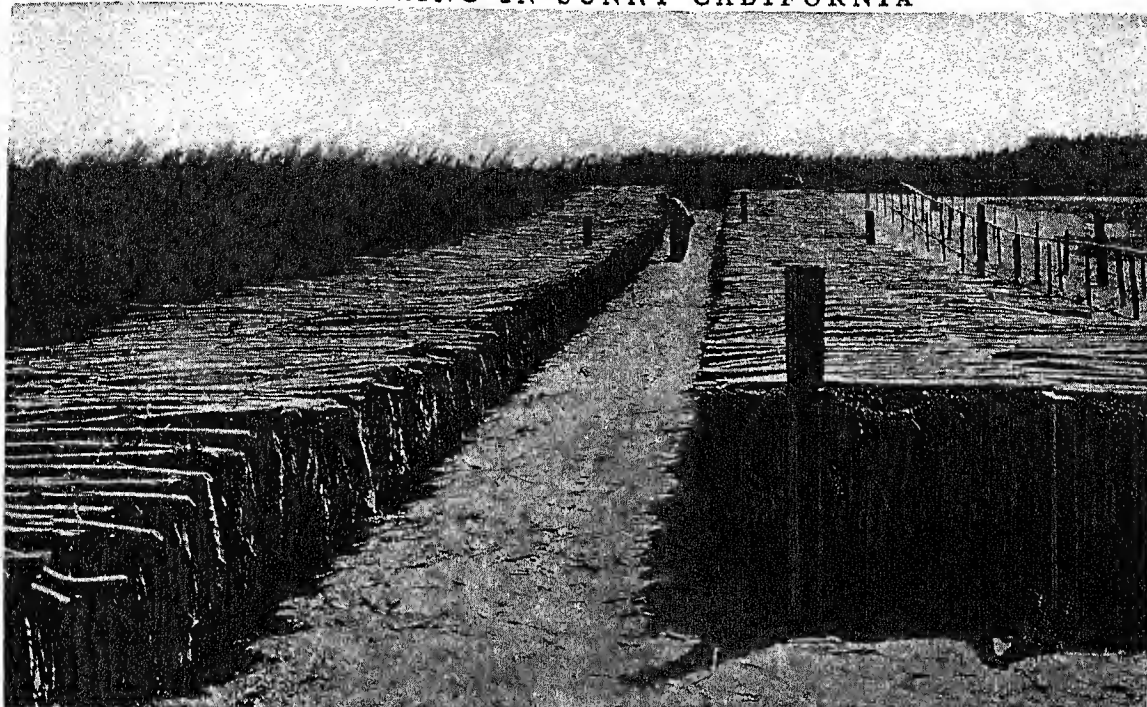
The finer grades of tobacco are so delicate that they thrive better and develop a richer flavor when they are grown in the shade. Hence whole fields of tobacco are often grown under cheese-cloth tents, as in this picture. The expense of this method is more than repaid by the greatly increased value of the leaf and the increased production.

as snuff; and tobacco pipes have been found in prehistoric mounds. Often, as in the case of the pipe of peace of the North American Indians, its use was a sacred tribal custom. This strange Indian practice of "drinking smoke" appealed to the Europeans as one of the marvels of the New World. It was first a medicine, then a luxury, then the fashion as set by Sir Walter Raleigh.

From the time of its earliest use in Europe there was much opposition to it. James I of England published a bitter pamphlet against its use. Many

over 2,000,000 acres in the United States are utilized for its production. The world's crop is close to 5,000,000,000 pounds a year. The United States produces more than any other country, nearly 30 per cent of the total. North Carolina alone provides more than any foreign country except India and possibly China, whose exact production is not known. It is cultivated in many states, from southern Wisconsin to Louisiana and from Missouri to the Atlantic seaboard. The largest area of production extends from Kentucky to Maryland and from central Ohio to

SUN-CURING IN SUNNY CALIFORNIA



The sun-curing of tobacco is but little practiced in the rest of the United States, but in sunny California this method is successfully employed, the wilted tobacco being suspended on racks.

North Carolina. Besides being the largest producer the United States also uses more tobacco than any other country and imports more. India ranks next after the United States, both in production and consumption. Other important producing countries are China, Russia, the Dutch East Indies, Japan, Germany, Turkey, France, Belgium, Italy, Greece, Hungary, Cuba, Porto Rico, the Philippines, Mexico, Brazil, and Canada.

Although all the varieties of tobacco came from two or three native American species, they differ greatly in size, thickness, and color of leaf, according to varying conditions of soil and climate. A field of tobacco is not so attractive as a coffee or tea plantation or a stretch of waving wheat or oats, for the plant is coarse and rank, with large drooping leaves on a thick central stem, gummy and clammy to the touch from the sticky secretion of the short hairs that cover the green parts of the plant. The large sweet-scented blossoms, which appear in a cluster at the top of the stalk, range in color from deep pink to nearly white. The buds are usually cut off before they open, to turn the nourishment of the plant entirely to the leaves. The black seeds are so very tiny that 60,000 of them make only one tablespoonful, enough to sow 100 square yards of seed bed.

Not only does the tobacco plant need great care, but it requires very careful fertilizing. Alternation of crops is almost a necessity. The soil of many sections of Maryland and Virginia was sadly depleted by successive plantings in the early days.

Tobacco will grow from tropical to north temperate climates, but various regions are specially adapted for growing certain types of tobacco, some for the making of cigars, others for "manufactured" tobacco—smoking and chewing tobacco, cigarettes, and snuff. About ten per cent of the United States crop is cigar leaf and 90 per cent is "manufacturing" tobacco. The finest cigar-wrapper tobacco is grown under cheesecloth shade in the Connecticut Valley and in a small area of Georgia and Florida. Wisconsin, Pennsylvania, and the Miami Valley of Ohio and Indiana also grow cigar types. Burley is the most extensively grown of all kinds, being an important crop in Indiana, Kentucky, Ohio, Tennessee, and West Virginia. It is used chiefly for cigarettes, smoking tobacco, and plug tobacco. The bright flue-cured or yellow tobacco grown in southern Virginia, the Carolinas, Georgia, and Florida, is the most important cigarette type. It is exported in enormous quantities. Dark fired tobacco from Virginia, Kentucky, and Tennessee is grown chiefly for export to foreign countries. Much of it is used in the manufacture of snuff. Perique, a very black and strong type used in smoking mixtures, is grown only in one small section of Louisiana.

The tobacco leaf of Cuba is world famous for its aroma and makes the finest of all cigars. The mild tobaccos of central and northern Europe are chiefly used in the pipe and the fine leaf of Sumatra is used in cigar-making. Turkey and the Balkans grow a tobacco of peculiar aroma which is used in making fine Turkish and Egyptian cigarettes. The leaf is

small, about four inches long, and an inch and a half broad. In Japan big dark leaves are grown, which are used largely for cheap cigars. China sends a light-tissued flavorless leaf which is chiefly used to give a bright tint to other tobaccos. Indian tobaccos are used largely in cigar manufacture.

In France the production and manufacture of tobacco are under government supervision, and in Turkey and Japan they are a government monopoly. In nearly all countries tobacco is taxed and is a source of considerable revenue.

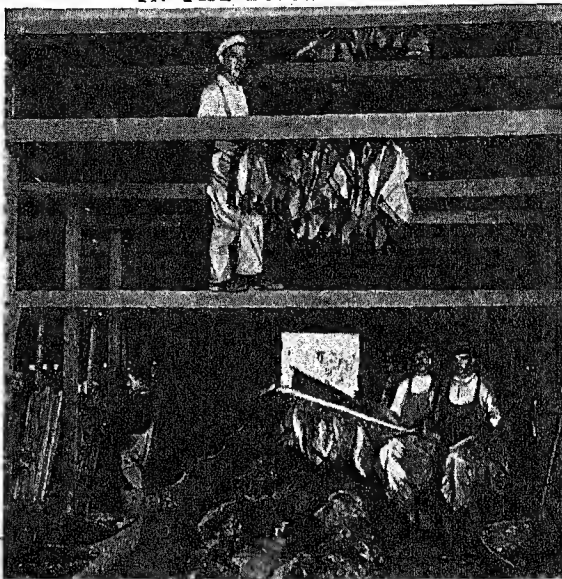
The tobacco leaf is green when harvested and does not have the characteristic color and flavor until it is cured, which includes drying, fermentation, and ageing. There are three methods of drying, or curing proper. Sometimes the leaves are sun-dried. This results in a very sweet chewing tobacco. The White Burley tobaccos as well as all cigar tobaccos are air-dried in barns and tobacco houses, so constructed that ventilation can be carefully regulated. The third method is by artificial heat—open fires or flues. The dark mottled brown leaves of parts of western Tennessee and Kentucky are cured over open fires. This gives them a characteristic smoky odor. In flue-curing, the fires are outside the sheds, and the heat is brought in by flues or iron pipes. This process results in the bright yellow leaf so largely used for pipe, cigarette, and chewing tobacco.

After drying, the leaves are brittle and cannot be handled without crushing to a powder, so they are left hanging until rainy weather, when they absorb moisture enough to become soft and pliable. Then the leaves are stripped from the stem, sorted, made up into small bunches, and fermented by piling in stacks five or six feet high. When fermentation is completed the tobacco is graded and packed. It is sometimes aged in a warehouse for four or five years, to make it more mellow.

Most cigars and a few of the most expensive brands of cigarettes are made by hand, but the less expensive cigarettes, as well as chewing and smoking tobacco and snuff, are made entirely by highly perfected machinery. Often the tobacco is flavored and given an artificial aroma with "sauces" made of sugar, licorice, spices, alcohol, etc.

The principal manufacturing centers of tobacco products in the United States are St. Louis, Durham, Louisville, Jersey City, Richmond, Cincinnati, Chicago, Baltimore, New York, and New Orleans.

IN THE DRYING SHED



The famous Connecticut leaf and most other American cigar tobaccos are cured in sheds like this, with many openings to permit free circulation of the air. Fires are kept going in the sheds during wet weather. In about six weeks the leaves are thoroughly cured, but they are so dry that they crumble at a touch. Hence they have to be left till moist weather occurs, when the leaves become soft and pliant so they can be stripped from the stems.

Tobacco owes its sedative and habit-forming powers to the drug nicotine, a deadly and dangerous poison. However opinions may differ as to the effect of tobacco on adults, all agree that it is very injurious to young people who have not attained their full physical development.

Scientific name of the principal tobacco of commerce, *Nicotiana tabacum*, a native of South America. This species supplies about all the cultivated varieties. The tobacco plant is a member of the nightshade family and is therefore a close relative of the belladonna or deadly nightshade, the tomato, the potato, and the jimson weed. The generic name *Nicotiana* was given in honor of Jean Nicot, French ambassador to Portugal, who in 1559 introduced the plant into France from Spain, where it had been

brought from Mexico in the preceding year by Francisco Fernandes, a Spanish physician sent there by Philip II.

TOKYO (15/kē-ō), JAPAN. The earthquake of Aug. 31, 1923, and the ensuing fire which swept some 9,000 acres of Tokyo, made a modern Phoenix of this capital and largest city of Japan. London, Chicago, and San Francisco all built bigger and better cities on the smoking ruins of disastrous fires, but none of them approached the marvelous reconstruction Tokyo accomplished in a brief seven-year program.

Modern steel and concrete buildings, proof against earthquake and fire, have replaced thousands of the city's old wooden structures. Hundreds of fireproof modern bridges now stretch across the Sumida River and its many connecting canals, replacing ancient wooden spans which burned in the fire following the earthquake and left thousands of helpless victims unable to escape the flames. The old narrow streets have been replaced by wider avenues that would help check the spread of a great fire should another such disaster threaten. All streets are at least 12 feet wide, and stretching across the city are a number of broad avenues with space for four rows of trees and several traffic lanes.

Much of this rebuilding was done by American architects and engineers, and American lumber and steel have gone into many new structures. American influence is apparent everywhere in Tokyo.

With this modernization Tokyo has become a fascinating blend of things old and new, Eastern and Western. The traveler may choose between fashionable European hotels and modest Japanese inns. The principal shops display signs in English as well as Japanese. On the streets one may hear spoken most of the languages of modern Europe. Native costume has not been abandoned, but for business purposes foreign dress has become commonplace, and the typical schoolboy uniform is of European cut. Japanese women in silk kimonos may often be seen accompanying their husbands, the latter clad in the height of London fashion. Foreign cooking is popular and European restaurants are common.

But most of the people still live in one-story frame houses, with wooden shutters open by day to the breezes and shut up like boxes at night; the walls are often of paper, and usually there is no heating apparatus but a charcoal brazier. Twice a year in present-day Tokyo a general housecleaning is carried on under supervision of the police. Then every householder is compelled to wash and scour everything in his home, for cleanliness has become a national habit, acquired through fear of the deadly oriental plagues.

In a peculiar sense Tokyo is the heart of Japan. It draws to itself the nation's most eminent men of letters, statesmen, journalists, politicians, lawyers, and physicians. No ambitious Japanese student considers his preparation complete until he has spent some time in the lecture halls of the capital. There are to be found the famous Imperial University, and the two great private universities called Keiogijuku and Waseda. The government has its military and naval colleges there, also normal and technical schools too numerous to mention. The newly founded Christian college for women was naturally located in Tokyo, where the movement for the higher education of Japanese girls had its origin. Such advantages make Tokyo the chief educational center of the Far East.

A City of Modern Origin

Tokyo is of comparatively modern origin. In the 15th century it was a small fishing hamlet, known as Yedo. On the fall of the Shogunate, in 1868, the Mikado took up his residence in Yedo, and soon afterward changed the name to Tokyo, meaning "eastern capital" in contradistinction to the western capital of Kyoto. On a height in the very center of the city stands the imperial palace, a modern building half Japanese and half European in its style of architecture, surrounded by a double line of moats. The massive stone retaining walls are crowned with gnarled old pines that afforded excellent shelter in medieval times for archers defending the stronghold. The inner moat is a favorite haunt of wild sea-birds.

In the palace district are the principal foreign embassies, governmental buildings, and banks. This quarter and the great business districts to the east are crisscrossed by a network of canals emptying into

the river Sumida. The most famous of the bridges across the Sumida is the Nihon-bashi (Bridge of Japan), the topographical center of the empire and the place from which all distances are measured. Foreigners take special interest in this bridge because it was here that in bygone days were posted notices prohibiting the practice of Christianity.

The city covers a vast area, so that even today, with all its modern buildings, it has lovely rural aspects. This is due to the large number of parks and gardens and the abundance of trees. During April the avenues of cherry trees in these parks transform the city into a veritable garden of pink bloom, and no other place or season affords so good an opportunity to see the beauty-loving Japanese in their happiest mood.

Manufacturing districts stretch to the northeast along both sides of the Sumida and border Tokyo Bay south of the business district. Some 20 per cent of Japan's industrial products are manufactured in the capital city. Hydroelectric power is used in many of the factories, which produce chemicals, foodstuffs, textiles, machinery and tools, metal goods and various other commodities. Population, about 6,780,000.

TOLEDO, OHIO. Rapid growth and prosperity have come naturally to Toledo, for few cities in the United States occupy a position of greater strategic importance in the competition for commerce. Situated near the mouth of the Maumee River at the western end of Lake Erie, Toledo enjoys the best of transportation facilities by rail and water, and commands a region thickly populated and rich in varied products. To the north and west lie the timber and mineral wealth of the Great Lakes region, the fruit orchards of Michigan, and the fertile plains of Indiana, while to the south and southeast lie the boundless resources of the great Ohio valley. Its position at the head of the direct lake route to the east makes it a great distributing point for the region southwest.

Toledo is the most important coal port on the Great Lakes, handling about half of the cargo coal carried by lake vessels. On its extensive wharves this coal from the mines of Ohio, Pennsylvania, and West Virginia meets the stream of iron and copper ore, grain, and lumber brought by water from the Northwest. Chief among the city's products are automobiles, automobile bodies and parts, bottles and other glass products, and gasoline. Some of the largest refineries in the nation are located in Toledo, to which the petroleum is piped from the mid-continental fields. Machinery, stamped and pressed metal wares, and gloves are also leading products.

Toledo has many parks and playgrounds. Walbridge, with a zoological garden, and Bay View, both on the Maumee River, are the largest. Conspicuous among its cultural institutions are the Museum of Art and the University of Toledo, which is maintained by the city. There is a municipal airport.

In 1935 Toledo adopted the city-manager plan of government. A council of nine members, elected by proportional representation, determines the policy of

the government. The council elects a city manager, not of its own number, to carry out its policies and administer the affairs of the city. In earlier days the city had become known for its successful efforts to free itself from machine politics under two reform mayors—Samuel M. ("Golden Rule") Jones, an idealistic manufacturer, and Brand Whitlock, later the ambassador to Belgium during the World War.

Toledo was founded in 1833 by the union of two earlier settlements on the Maumee, and named after the old Spanish city. In 1836 it was made the southern terminus of the first railroad in Ohio. It grew rapidly after the opening of the Wabash and Erie Canal in 1843 and the Miami and Erie Canal in 1845. Population (1940 census), 282,349.

TOLSTOY (*töl-stoi'*), **COUNT LEO** (1828–1910). Few men of modern times have had a greater influence on the world's thought than Tolstoy. His novels are models of power and realism; his social ideas sent out ripples to all parts of the world.

He was born in 1828, the fifth child in a noble family of Russia. In his book called 'Childhood' he gives the recollections of his life in the country, of learning to ride horseback, of trying to fly by jumping out of a second-story window. At school in Moscow he early gave promise. His tutor said, "That youngster has brains; he is a little Moliere." But the young Tolstoy had qualities which were greater than mere brains. Even in his early days he sought for truth through all sorts of speculation, and not only did he seek it, but he put it into practice.

Unluckily for his own peace of mind, however, Tolstoy had another side to his nature which was equally strong. He loved pleasures of all sorts: dancing, feasting, drinking, good company. In other words, he was like all the other young Russian nobles of his day, who were more or less dissipated. A visit to the Caucasus seems to have turned his thoughts to soberer things, and in 1852 he joined the army. The great amount of leisure drove him to write down some of the thoughts that tormented him for expression. 'Childhood' was the first of a series of stories which appeared within the following two years.

In 1854 Tolstoy entered the Crimean War as an officer. His experiences there gave him a great fund of material. The 'Sebastopol Sketches' exposes not the glory but the grim horror of war. His campaigns there gave him the basis for his story of Napoleon's invasion of Russia called 'War and Peace'. Various other novels, among them 'Anna Karénina', appeared at intervals during the years.

Although Tolstoy was acclaimed as a great writer, there were many reasons why fame did not satisfy him. Even in the earliest days he had tried to relieve

the dreadful distress and poverty of the Russian peasants. He had taught in a school himself, he had tried to send a message to the world through his novels. But there the rigid censorship held him back. He had severed his connection with the orthodox Russian church because he did not think it expressed truly Christian teachings. Had it not been for the love and veneration in which the people held him, he would surely have been exiled for his liberal views and teachings.

In 1891 Tolstoy had crystallized his beliefs as follows: To be perfectly pure; to be perfectly free (not to take oaths); never to use violence for the protection of one's self or others, even against an animal; to do good to one's enemies. To carry out such a program of life would be impossible as society is constituted now. But Tolstoy with his accustomed fervor tried to put his beliefs into practice. He made shoes for a living, became as simple in his habits as a peasant, and divided his wealth among the members of his family.

During and before this period he wrote powerful articles setting forth his views. 'The Kingdom of God is Within You' was brought to America and England, where it was published. In Russia it was forbidden. He even simplified his art to the writing of fairy stories for children.

Tolstoy died in 1910, mourned by all the world. Many people did not agree with him and yet even to them he was an inspiration. He made plain the evils of the day. His writings are in large part a revelation of the soul of the Russia of the later 19th century. They reveal its idealism under a harsh exterior, its childlikeness, its depression and exaltation, its militant zeal coupled with a hatred of war and force, its care for human worth in the midst of a brutal and debasing autocracy. Tolstoy helps us to understand the nation which plunged in eight months from the rule of the czar to the dictatorship of the proletariat.

His chief works are 'Sebastopol' (1855); 'War and Peace' (1864); 'Anna Karénina' (1875); 'My Confession' (1882); 'The Kingdom of God is Within You' (1892); 'Resurrection' (1899).

TOMATO. In the old-fashioned gardens of our great-grandmothers there grew a bushy sprawling plant with brilliant scarlet pulpy fruit, much wrinkled and distinctly smaller than the tomatoes of today. These were called "love-apples," and if you had suggested eating one your great-grandmother would have held up her hands in horror; for the plant belongs to the same family as the deadly nightshade and it, too, was thought to be poisonous. It was not until well into the 19th century that this idea was proved false, and tomatoes began to be cultivated for their agreeable, slightly acid fruit.

COUNT LEO TOLSTOY



Few men in history have exercised so profound an influence upon their native land as Tolstoy exercised upon Russia.

Today the tomato is one of our menu-card favorites. It is a welcome ingredient in soups, may appear in any one of a dozen ways as a vegetable, is an almost indispensable ingredient in a meat relish, makes a tart green pickle, and is at its best in salad. Tangy flavor and richness in vitamin C make canned tomatoes and tomato juice extremely popular.

Tomatoes are now cultivated in all temperate regions of the world and they are canned in greater quantities than any other vegetables. They are also the basis of tomato catsup (or ketchup), chili sauce, and other relishes. A century of cultivation has given us a great smooth, thin-skinned, fleshy fruit, instead of the small seedy specimens of the old gardens. Some varieties now reach two or three pounds in weight. Some large kinds are yellow when ripe, but these do not ship well and are now rarely met with.

The tomato plant, like the potato, was originally found in South America. It is a bushy annual grown from seed. The plant has jagged leaves and small yellow bell-like flowers. The tender branches cannot support the modern heavy fruit and require staking. Oil pressed from tomato seeds is used in Italy for making soap. Scientific name of the tomato, *Lycopersicum esculentum*.

TONGUE. Without tongues, we should not be able to speak, or chew our food, or taste it, or swallow it in the ordinary way. So it is easy to understand why that comparatively small organ which lies in our mouths has been called the most important of the muscles of our body over which we have control, for the heart, of course, is an involuntary muscle.

While nearly all animals have tongues of one kind or another, it is in the human being that this organ reaches its highest and most versatile development, for the articulation of words in speech requires the most active and pliable maneuvers—the tongue becoming in turn round or flat, long or short, curled up or extended, and shifting from one position to another with remarkable speed and accuracy. The tongue's importance as an organ of speech is evident when we consider the case of children who are born "tongue-tied," the tip of the tongue being fastened down and its movements so bridled that speech is made indistinct. Stuttering and stammering also are caused in part by inability to control the movements of the tongue through the nerves and muscles.

The sense of taste depends on certain little projections called "taste buds" located on the top, sides, and back of the tongue (*see Taste*). The tip of the tongue has more endings for sweet, and therefore we can taste sweet things better at the tip. The back of the tongue is better developed for bitter. A good many substances have a combination taste. Epsom salts is bitter and salty at the same time. Many others have little or no taste but an odor which we

chiefly recognize when we get them in the mouth. Hence we confuse smell and taste. If you take some dry ground coffee in the mouth while holding the nose, you will be surprised how little taste it has. Now let the air pass back and forth through the nasal passages and the flavor of coffee instantly appears. From this experiment you get an explanation of why many things lose their "taste" when we have a cold. It isn't the taste, but the smell that is gone.

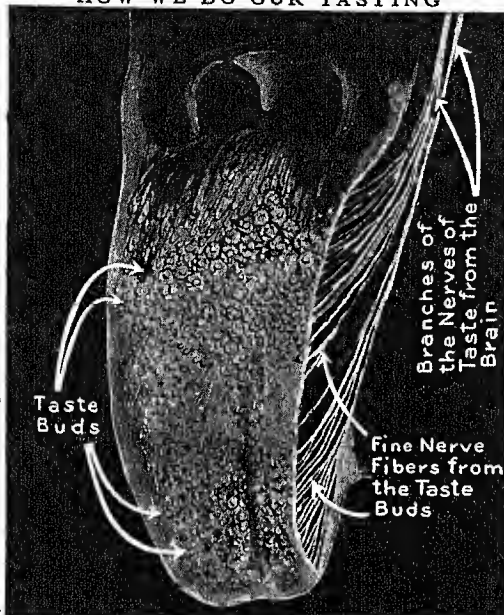
The delicacy of taste varies for different substances. One part of sugar in 200 of water can just be detected; while one part of quinine in 200,000 of water can be distinctly tasted.

Taste is useful in making a choice of foods. Among animals it is the best guide. But man lives under artificial conditions, and often the

sense of taste is cultivated abnormally. Some people take only things they like to eat. People have actually died while surrounded with plenty, because they did not choose the foods their bodies needed. Children should learn to eat a considerable variety of foods, as only thereby can the body get all the substances it needs. (*See Food*.)

Among the lower animals are found many curious tongue forms. The members of the cat family, for instance, have bristle-like projections on their tongues for rasping the flesh from bones; grass-eating animals have long tough tongues for gathering the grass into bunches before they bite it off; woodpeckers are equipped with slender barbed darts with which they impale the worms they have dug out with their beaks; toads and chameleons have long sticky tongues fastened to the front of their mouths, which they flip out and draw back with their insect prey glued fast. Queerest of all, perhaps, are the forked tongues of snakes, which some scientists believe to be the organs of a sort of sixth sense (*see Snakes*).

HOW WE DO OUR TASTING



Here you see the machinery of taste; the tongue with its taste buds and the nerve fibers from these buds which connect with the nerves of taste running up into the brain. It seems odd—doesn't it?—that while the tongue does the tasting, it hasn't an idea how things taste until the taste center in the brain says, "This is sweet or this is sour," "This is bad, spit it out!"

TOOLS—*The BUILDERS of CIVILIZATION*

*How Men Have Taken Lifeless Stone and Wood and Metal and Put Them to Work—
Giant Devices that Pound and Stamp and Bore and Cut and Shave—
The Ingenious Labors of the Lathe Family*

Tools. Man's answer to tasks beyond the power of his body, in the working, shaping, and moving of materials, was the invention of tools. With them he multiplied his power, and supplemented the work of his hands and feet. Of all the creatures, man alone is a user of tools. The first tools were of the simplest nature, being instruments for striking, for cutting, for shaping, for holding, and for moving things. But man had always possessed these in his body itself, for the fists and feet were his striking tools, his nails and teeth served him for cutting, the hands could grasp things and shape them, while arms, legs, and jaws could furnish power and leverage to enable him to perform certain tasks.

The first man who thought to crack a nut with a stone, utilized the first tool of the hammer type. A later genius tied a handle to it and made the first hammer, which has come down to us in so many adaptations. Whoever found that a shell or sharp stone would cut invented the first knife, ancestor of the great family of cutting tools. The first leverage tool was probably only a stick, used perhaps to pry up a stone, but it has been succeeded by many others. We shall never know who first scraped mud with a stick, or a stone, or a shell, but at that moment the first shaping tool came into existence. And holding tools had their primitive

counterpart when some flint worker thought of wedging his material between two stones or in a cleft stick. Today, all our tools may be so classified; even the most complicated may be seen to be adaptations and improvements, or combinations of these five principal divisions of tools.

Striking or Percussion Tools

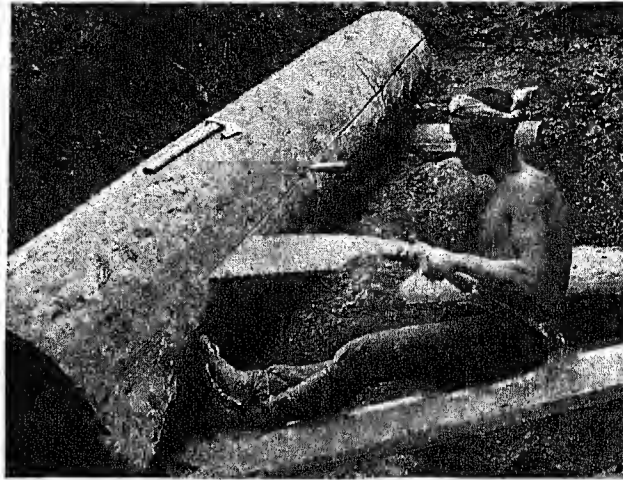
The hammer is the simplest of tools, and has undergone little change, in most respects, from its primitive form. It is, after all, just a weighted head, whether that be a stone or a thousand-pound casting, and something to direct its course, which may be a lashed-on stick, or the channels of a great drop-forging hammer.

It was important to early man, for with it he killed beasts for food, defended himself, and later fashioned yet other tools. The striker of blows, the smiter, the smith came to be a personage. On his crude anvil the swords and shields, the pots and pans, the armbands and necklets took shape under his hammer. Later

came specialists in his trade, each with his own special tools—the armorer and gunsmith, the coppersmith and ironsmith, the goldsmith and silversmith.

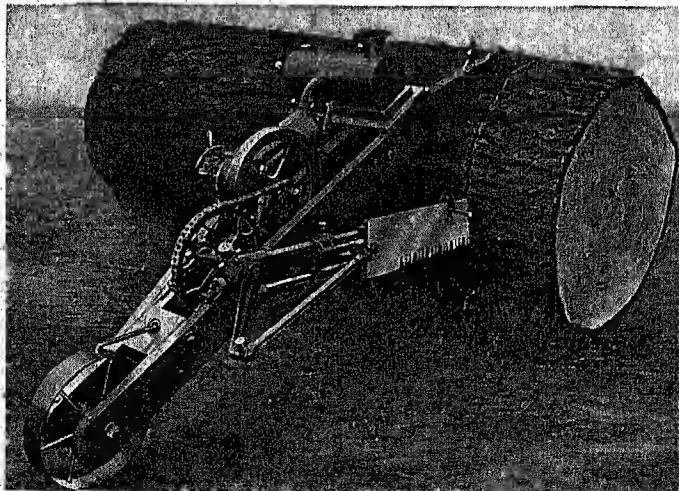
Today we have many kinds of hammers, from the common sledge, with its two faces for striking, to the claw hammer, which is a combination of a percussion tool with a lever and a holding device. In many trades combination hammers are used, one face

LABORIOUSLY SLOW WORK WITH PRIMITIVE TOOLS



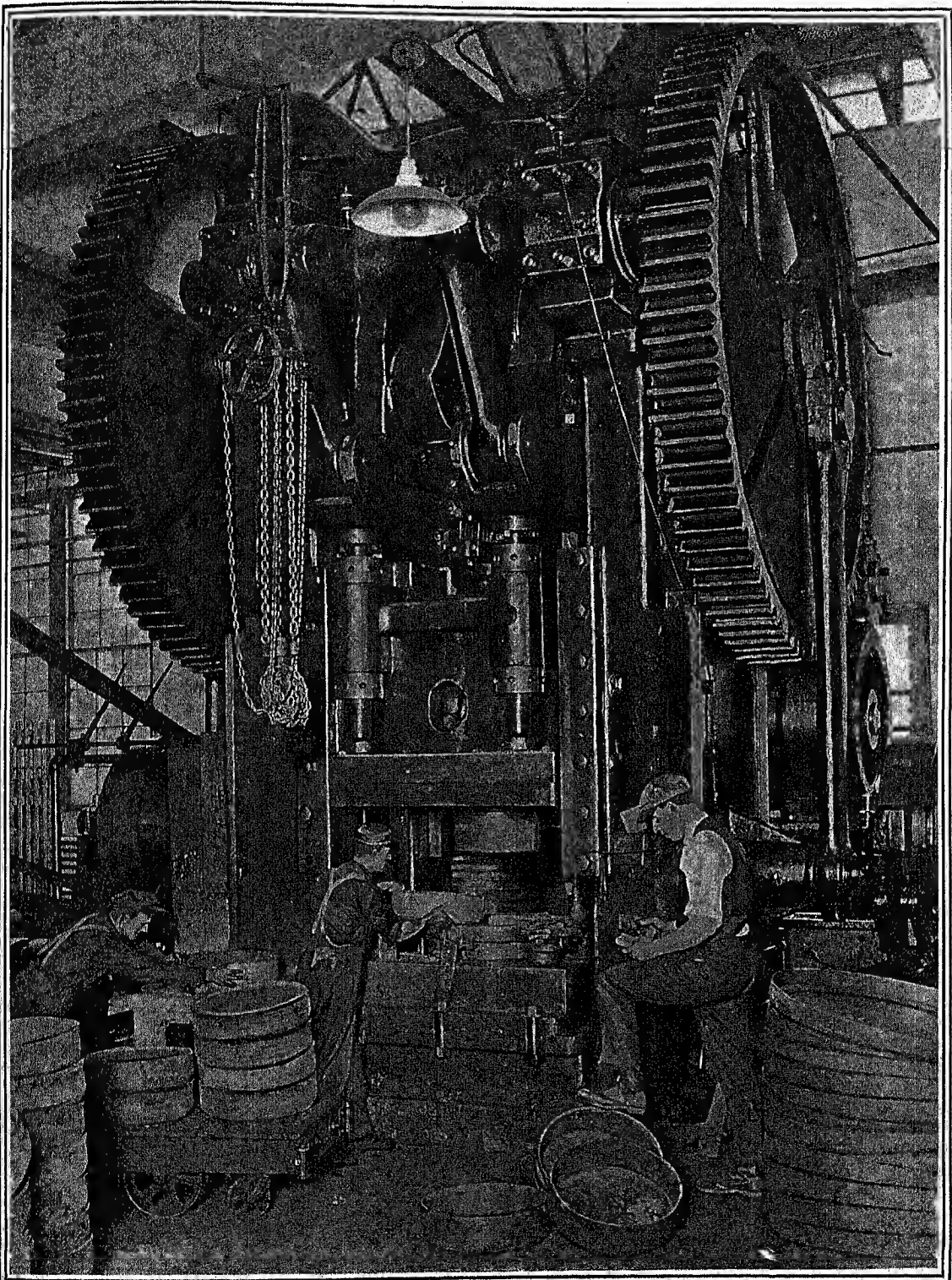
This patient Japanese wood sawer will work all day long to cut this great log apart, and then he will have to cut it again and again to make planks of it. His ax, lying on the tree trunk, and the saw are not as primitive as many still in use today.

A MODERN PORTABLE SAW RIG



Compare this cross-cut saw, operated by a gasoline engine, with the hand method of sawing shown above. It will make from 100 to 200 strokes per minute, and the saw will be driven through timber at the rate of a foot or more a minute.

SQUEEZING STEEL LIKE PUTTY



This powerful press is engaged in "stamping," "drawing," or "forming" automobile brake drums. The operation shown is the "second draw," that is, the depth of the drum is increased as its diameter is reduced. The pile of pieces at the right of the picture are the drums in the first state. They were formed perhaps in one operation, that of cutting the flat sheet into circles of the proper size, and possibly forming the turned up edge at the same time. Nearly all metal dishes, pans, automobile bodies, mud guards, and so on are formed in such machines, many of them much larger than this. The powerful action of this press is obtained from the toggle-joint action above, one of the most powerful mechanical motions known.

for striking, and the other for shaping. Other hammers have one cutting or punching face.

There are also remarkable developments of the hammer. The rat-tat-tat of the pneumatic riveter is the sound of the hammer, driven at high speed by compressed air. Rock drills and pavement breakers are of the same type. Then there are huge mechanical hammers, operated by steam or electricity, which perform operations no smith could hope to do. The steam hammer was devised by an engine builder, James Nasmyth, who invented it to forge the crankshaft of an engine—to be the biggest then known, to go into the largest vessel of its time. The problem of forging such a crankshaft seemed insurmountable, owing to its size; so Nasmyth used steam to lift a heavy block of iron, faced with steel, which dropped, guided by channels, onto the work, exerting more effort than a thousand men could apply with hammers.

Drop forging, as this process is called, is now used for many operations, the forging of crankshafts for automobiles and other engines, and for the production of many other parts. Pile drivers are mechanical hammers, sinking long heavy piles deep into hard earth in a few minutes, where it would take hours for men to do the job with heavy mauls. The skull-cracker, breaking up scrap iron in the foundry yard, is a hammer, its tremendously heavy ball being lifted by electric magnets, and then released to shatter the iron below into pieces suitable for the furnace.

Leverage Tools

The simplest of the lever tools is the common crowbar, sometimes made with one end bent slightly, so that in effect it supplies its own fulcrum. Car movers are large tools of this simple type. A screwdriver is a lever tool, although the connection may not at first be clear. But widen the handle into a T and the lever principle is obvious. The brace, to hold a bit, is a form of the lever known as a crank, and so is its improvement, the breast drill and other similar tools, operated by a crank and gears. Both are combinations usually, as they are fitted with a

holding device called a chuck, in which the bits are inserted. The wrenches, whether the common wrench, the pipe wrench, the spanner, or the many kinds of socket and end wrenches, are lever tools, also with a holding device. Other lever tools are combinations with cutting tools, such as scissors, and metal shears that require leverage to do their work.

Holding Tools

Holding tools are of fairly simple character, although we have vises in many forms, adapted to various sorts of work, and more complicated developments like a lathe chuck. Pincers and tongs are holding tools, often in combination with cutting edges as in pliers, which are also used for shaping. Foreeps and tweezers are similar. Many tools of the more complicated kind are simple tools in highly adaptable holders, such as the plane.

Shaping Tools

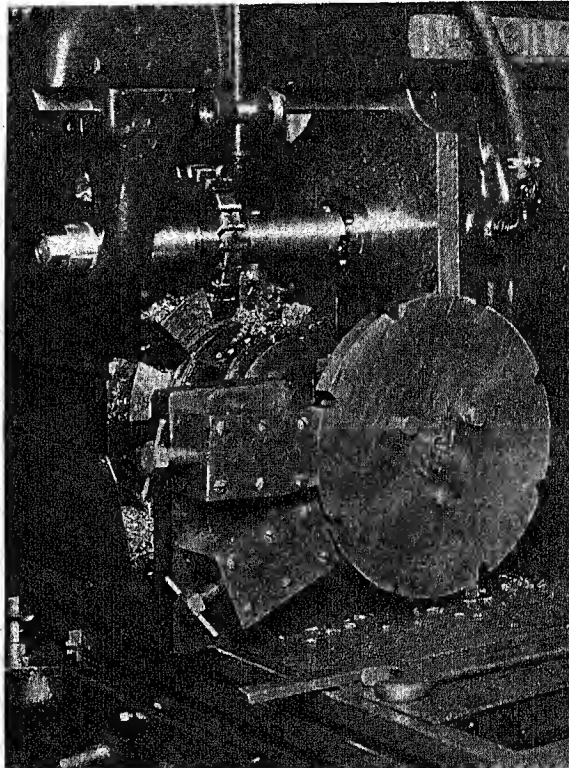
The trowel, whether the mason's pointed trowel, or the plasterer's rectangular trowel, the tuckpointer's smaller instruments and the putty knife, are shaping tools of the simpler sort. Paint brushes belong in this category, for there is little difference between smoothing a coat of cement or plaster and applying one of enamel. The blacksmith's anvil is a shaper; and there are bending machines for wire work, to handle sheet metal; forming tools of every description, mandrels, knurls, screw-rolling dies, rivet sets,

and others, from small punches used by jewelers to gigantic power presses that squeeze metal into shaping dies with a pressure of thousands of pounds.

The Great Family of Cutting Tools

Cutting tools, and their countless variations, form the largest division of the tools man has devised, for in working materials to usable size and shape cutting, trimming, and fitting are of the greatest importance. The first cutting tool was a crude knife, and for hundreds of years men used shells, stones, and even splintered and hardened wood. Weapons came first, then domestic tools, then tools for primitive farming, such as crude hoes, shovels, and plows. With the discovery of metal, and a means to work it, men

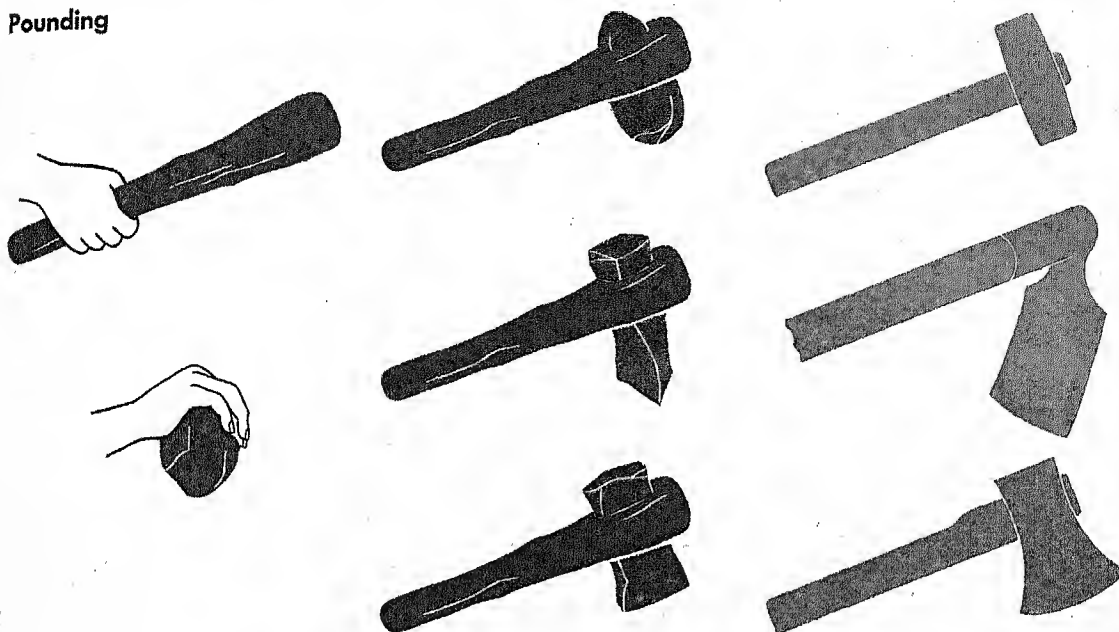
CUTTING OUT GREAT STEEL TEETH



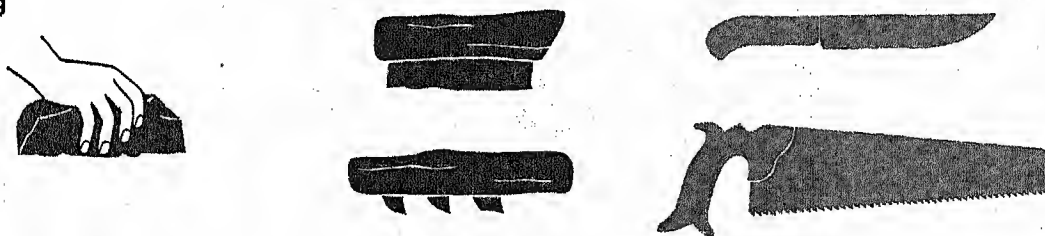
Next to the lathe, perhaps the milling machine is the most important machine tool. In this picture the milling cutter on the upper shaft, or "arbor," is cutting slots in the heavy piece of steel below it. The slots are accurately spaced by means of the "index plate" in the foreground, which is connected to the work. Such machines work to thousandths of an inch.

How Modern Tools Grew Out of Primitive Devices

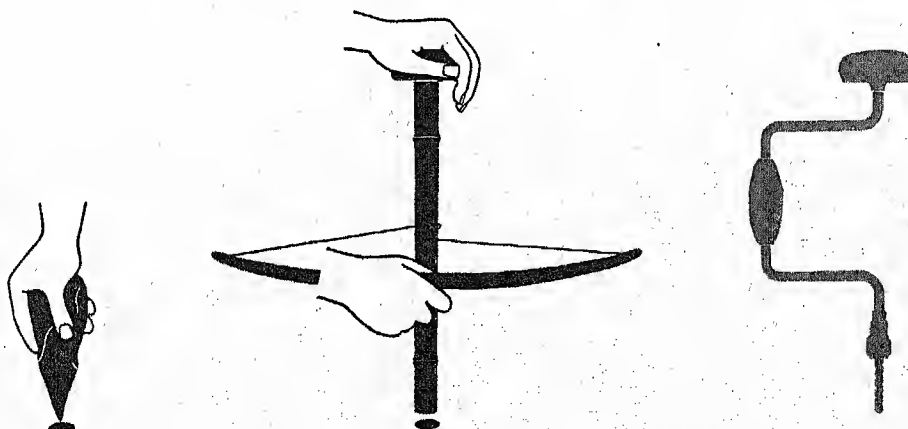
Pounding



Cutting



Boring



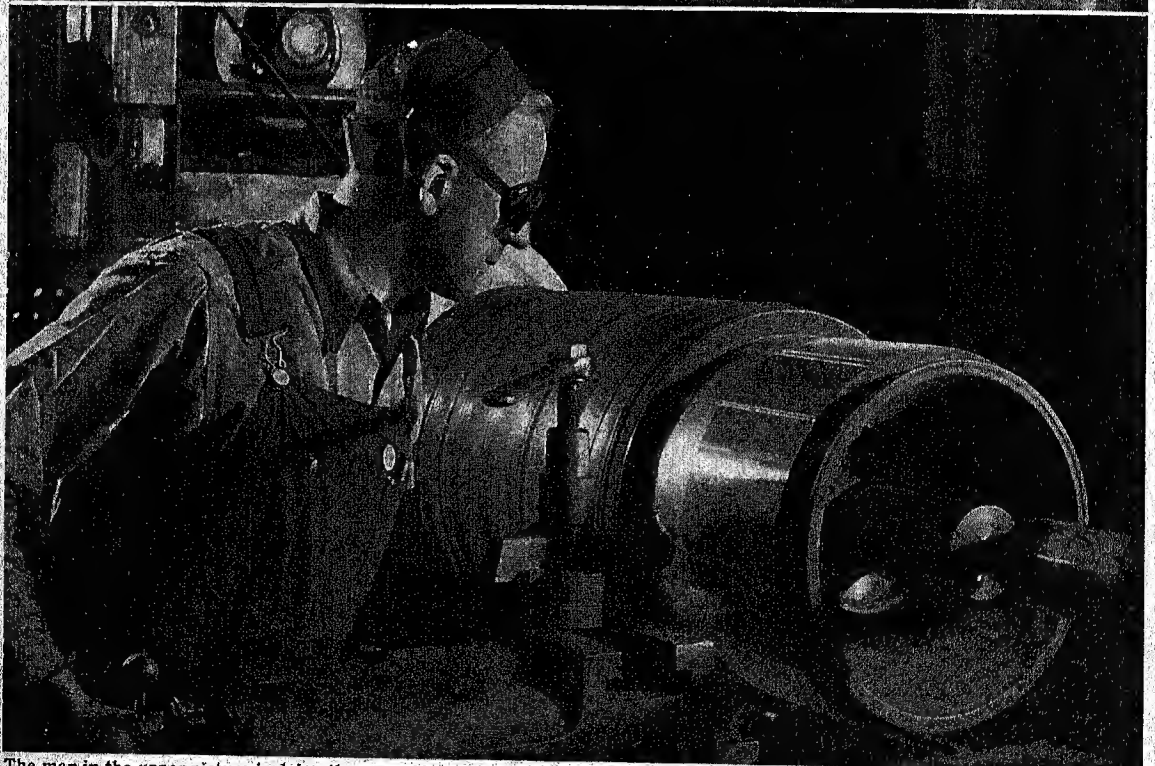
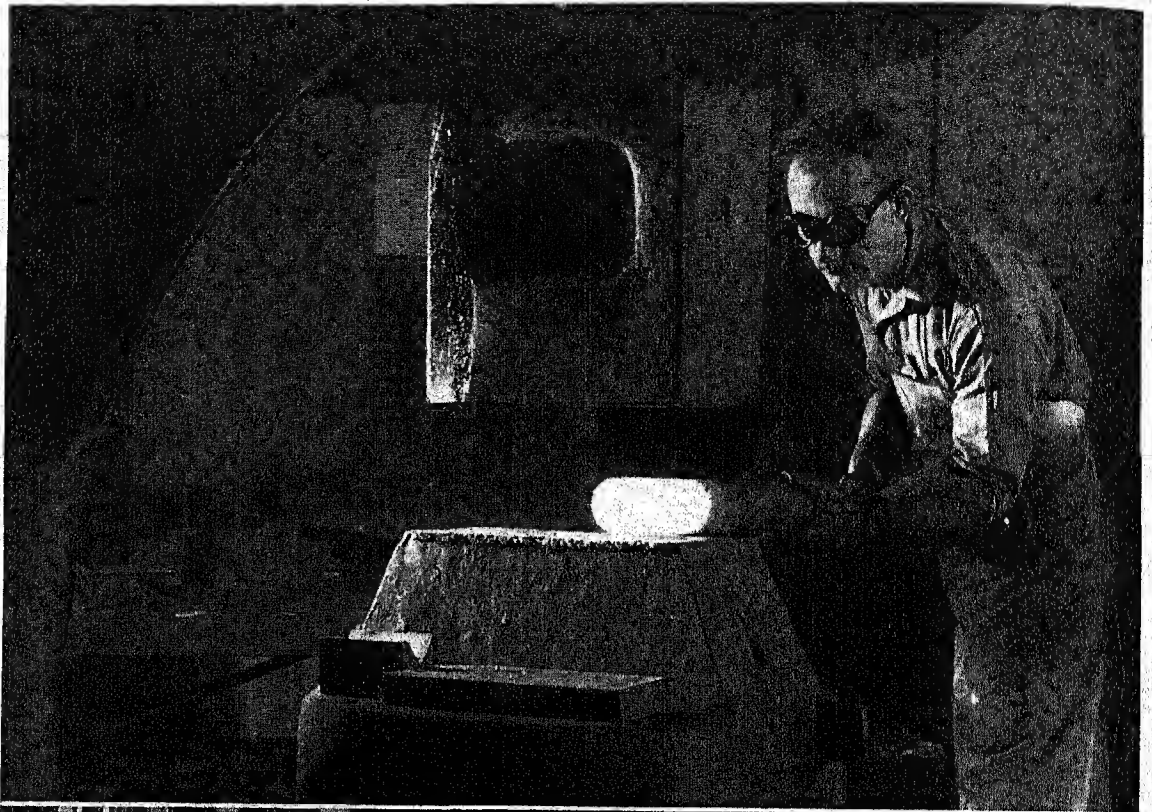
brown: wood

gray: stone

red: modern tools

Prepared for Compton's Pictured Encyclopedia
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HAMMERING AND CHISELING BY MACHINERY



The man in the upper picture is doing the same kind of work as the old-time blacksmith did when he hammered out pieces of red-hot iron on his anvil. But he is using a hammer that weighs several tons and so has to be lifted and dropped by high-powered machinery. The resemblance between hand-chiseling and lathe work, shown in the lower picture, is not so clearly evident. For, instead of the machine's driving the tool against the work, the tool is stationary and the work revolves against the tool's cutting edge.

began really to develop this powerful tool. The crude stone ax, an early tool that probably followed the hammer, gave way to an efficient sharp-edged implement. Knives and chisels could be made in a multitude of shapes, and the bad knife, which man had found made a good saw, could now be made with teeth set at regular intervals. As time went on, cutting tools were made for countless purposes, so many that it would be impossible to list them all. They fall into several easily distinguishable classes at the present time. There are sharp-edged tools for cutting and shaving, tools of the saw variety, with serrated edges, tools that cut by abrading or grinding, and certain tools of the punch type.

Edged Tools

The commonest of the edged tools are also the oldest: the chisels, knives, planes, augers and bits, reamers and countersinks, thread-cutting dies, axes, hatchets, scissors and shears, and hundreds of others. Some of the edged tools, like saws, are composed of many small cutting edges, but act to tear rather than slice the material. Files and rasps are of this type, while grinders that utilize the scratching or abrading properties of certain substances like minerals are quite similar, as a still greater number of fine cutting surfaces are presented to the work. Originally used for finishing edges, the grinder has become of paramount importance in machine work, and is standard equipment used in a great variety of operations involving high accuracy. Punches are of many kinds, and are frequently used for making holes of various shapes in place of the longer operation of boring.

Mechanical Principles in Tools

Simple tools satisfied the needs of workers for many years, but as wants increased and experience grew, developments of far-reaching importance were made. Men discovered certain mechanical principles (see Mechanics), and with them the means to make work more effective. Some of these applications of mechanical principles are not tools, in the strictest sense of the word, but they served to make tools more powerful. The crank, the wedge, and the wheel were applied to tools, with amazing results. From the wheel developed the pulley and block, and the windlass, and most important of all—the lathe.

The potters' wheel is one of the oldest of wheeled tools, for no one knows when or where it was invented. But when man discovered how circular motion could be made to work for him, he made the first start toward the great tools of today. This primitive potters' wheel was the first lathe, and for many years men shaped vessels of clay upon it. Then some genius thought to shape wood with it, holding a sharpened cutter or chisel against the revolving piece of wood. Later it was used for turning metal.

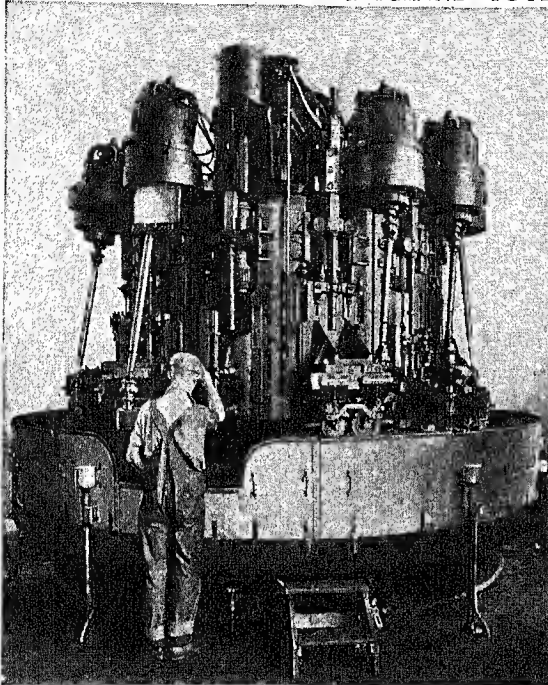
But no great progress was made until about 1800, when Henry Maudsley, the first great toolmaker, took the crude metal-working lathe of his day and added to it the slide rest and an automatic screw-cutting attachment. This may be termed one of the great inventions leading to the industrial age, for with his inventions man was able to obtain accuracy and maintain standards in the working of metal parts. Up to that time there was no such thing as a standard thread; nuts were not interchangeable as now. Engine cylinders, crude affairs with sheet-iron cylinders and hammered pistons with sometimes as much as three-fourths of an inch clearance, could now be cast in the foundries and accurately bored and finished. The immediate improvement in the engine was marked, and the application of its power to industry increased the demand for more machines, which meant more tools, and better ones.

Standard Machine Tools

The machine shop of today has a number of standard tools, besides many special ones. The lathe, the drill press, the shaper, the planer, the milling machine, the grinding machine, and the boring mill, are usually considered standard. The special ones are all modifications of the standard machines and their operation can be understood easily.

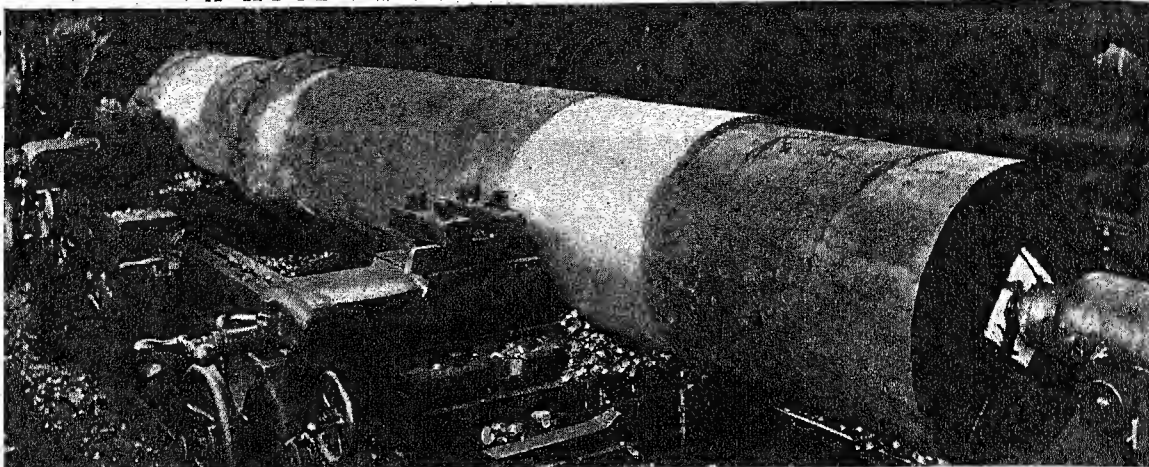
The lathe is simple in principle: the material to be worked is rotated, and a cutting tool, usually fixed in a movable holder, is "fed" against it, removing a chip or shaving of the metal, keeping it to a circular form. *Longitudinal feed* is parallel to the axis of the work; *cross feed* is at right angles to it; the first producing *straight turning*; the latter, *facing or squaring*. Tapers are cut at an angle to the axis. Threads may be cut on the

A HIGHLY SPECIALIZED MACHINE TOOL



All the spring hangers on automobile frames made by one maker are "machined" completely on this complicated automatic device. Such a machine tool is almost a complete shop in itself.

A HUGE LATHE TURNING OUT A NAVAL GUN



work by means of a specially geared, movable cutter.

The drill press is a tool for making holes in metal. The work is held on a special table, either by clamps or in a special device, and the cutting tool, revolved by power, is fed into it.

The shaper is used for finishing flat surfaces of smaller size, the work being held on a firm bed, while the cutting tool moves forward and back, cutting on the forward stroke. The bed and tool head are usually arranged to feed, or move, automatically. The planer is somewhat like the shaper, except that the bed to which the work is fastened moves backward and forward, while the tool head is stationary. In the milling machine a toothed cutter revolves against the work, removing the material by means of its sharpened edges. Cutters are of a great variety of shapes and sizes.

The Important Grinder

The grinding machine uses an abrasive wheel to obtain accurate and fine finishes on metal parts, as for example the inside of automobile cylinders. The boring machine may be of two types, vertical or horizontal, and is used for enlarging a hole, or finishing one that cannot be handled on a lathe or drill press. In the vertical type the work revolves and the tool is fed to it; in the horizontal machine, the tool revolves.

Turret lathes and screw-cutting machines are evolutions of the lathe, and are used for special purposes.



In the upper picture we see a rough gun forging carefully centered in the lathe and revolving slowly while heavy tool bits shave down the outer surface to a smooth and uniform shape. Below we see the gun supported on the "steady rest" of a lathe, while a boring tool is about to be pushed through the bore to bring it to exact size. Later an even more complicated tool will cut the rifling grooves in the barrel.

Gang drills are drill presses in which a number of drills work simultaneously. Tapping machines cut threads in drilled holes automatically.

Punches, combined with dies, are used for the rapid formation of shaped materials, having an endless variety of applications and practical uses.

The extreme accuracy demanded by modern machine work, has resulted in a class

of instruments that cannot properly be called tools. Measuring devices have been known to man for many years, and rules, measures, instruments for laying out work and testing it, such as the square, the plumb, and the level, go far into antiquity. Their modern counterparts are calipers, micrometers (*see Micrometer*), and gauges of many shapes and uses, that enable men to produce with tools work that is accurate to within a thousandth of an inch in common practise, and in special work to the amazing figure of two ten-thousandths of an inch and even less.

TORONTO, ONTARIO. On account of its eventful history, the character of its inhabitants, its position as the capital and chief city of the province of Ontario, and its prominence in the educational and industrial life of Canada, Toronto is one of the most representative cities of the Dominion.

It is the second city in size and importance in the country, ranking next to Montreal, but while Montreal is largely French, Toronto is the most ultra-British

city on earth. The number of Union Jacks that flutter over it on patriotic occasions is a surprise to the visitor, and in the World Wars enthusiasm for the cause of the Allies was nowhere more ardent than in Toronto. A considerable proportion of its residents claim descent from the United Empire Loyalists who were driven from the northern colonies during the American Revolution. These people naturally entertained no love for their old neighbors, and in the War of 1812 they fought valiantly when the Americans attempted to seize Canada. During the war, their town, then known as "York," or in bad weather as "Muddy York," was burned. On the ashes, however, there arose one of the trimmest, cleanest cities on the continent. The city was incorporated in 1834.

Toronto is a city of distances. The streets are long, broad, and tree-lined when you get beyond the business center. Among the many beautiful buildings are colleges, government buildings, and churches. The University of Toronto in Queen's Park is one of the leading universities of Canada. It was chartered by George IV in 1827 as King's College. This university gave to the world insulin for the treatment of diabetes, discovered by one of its professors, Dr. F. G. Banting, and his associates.

But Toronto is more than a city of beautiful buildings; it is a large industrial and commercial center. In it flourish hundreds of industries, from the manufacture of agricultural implements to the making of soap. Machinery, ships, leather, wood products, clothing, and automobiles are some of the many other varied products. Manufacturing is promoted by the cheap electric power obtained from Niagara Falls, 83 miles distant. It is also an important distributing point. With a fine harbor on Lake Ontario, it can ship goods by water or by rail. It has a large lake commerce in lumber, grain, coal, cattle, and fruit. Population, 631,207.

TORPEDO-FISH. Sometimes an ocean fisherman reaching into his net will get a shock that almost paralyzes his arm. He has been "torpedoed" by a strange monster that looks and acts something like a bomb with a fat fuse attached to it. This fish is a living electric battery. He can turn on his own current whenever he pleases, and the shock he delivers when excited is powerful enough to make the fisherman uncomfortable for hours.

The torpedo-fish, which belongs to the general family of skates and rays, is actually equipped with a system of electric storage cells, situated on each side of his big circular body, near the head. These cells

consist of a group of prism-shaped compartments of muscular fiber, running perpendicularly through the body of the fish. The upper side of the torpedo is the positive pole of the battery, the lower side the negative. When he is out of water, the torpedo must be touched at two distinct points before the circuit is

complete and the shock received. But in the water, which is an excellent conductor of electricity, only one point of contact is necessary.

This "shocking" apparatus is not only used by the torpedo-fish to defend itself, but to stun and kill the smaller animals on which it feeds. If it were not for this, he would probably starve to death, for he cannot move very fast, nor are his teeth and small mouth

suited for catching or biting his prey. So he lies on the bottom until some creature comes near enough to be "electrocuted." Swimmers in southern waters occasionally strike one of these creatures with their feet, and many mysterious cases of drowning are attributed to the crippling effect of such electric shocks.

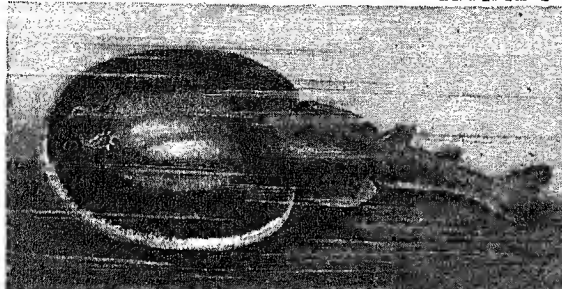
The torpedo-fish is round and flat, with a stout tapering tail to which the fins are attached. His body is smooth and soft to the touch. The largest species is found on the Atlantic coast from Cape Cod south, some of them reaching four feet in length and weighing nearly 200 pounds. When a torpedo-fish is weak or dying, his electric powers gradually disappear.

Several species of fish, notably the electric eel of South America, have the same strange faculty of generating electricity.

Scientific name of torpedo-fish, *Tetronarce occidentalis*; electric eel, *Electrophorus electricus*. The electric eel is remarkable for the great size of its electric organs, which are located in the tail. It can discharge enough electricity to kill an animal of considerable size, and is said to possess enough power to knock down and benumb a man. When the eel has made frequent use of this faculty its electric power becomes impaired and a long rest is necessary before it is regained. The natives take advantage of this fact in capturing the fish by driving large numbers of horses into streams where they abound. When the fish have exhausted their electricity by repeated attacks on the horses they are easily taken.

TORPEDOES AND MINES. During the World War of 1914-1918, and again when war broke out in 1939, the most widely effective weapons of naval warfare were torpedoes and mines. Both of these weapons are devised to blow a hole in a ship below the water line. To accomplish this, the weapon contains a heavy charge of guncotton or TNT, and a mechanism which explodes the charge the moment a ship is struck. The difference between the two weapons is in ability to move. A mine lies anchored or is set adrift, while a

THE TORPEDO-FISH AND HIS ELECTRIC BATTERIES

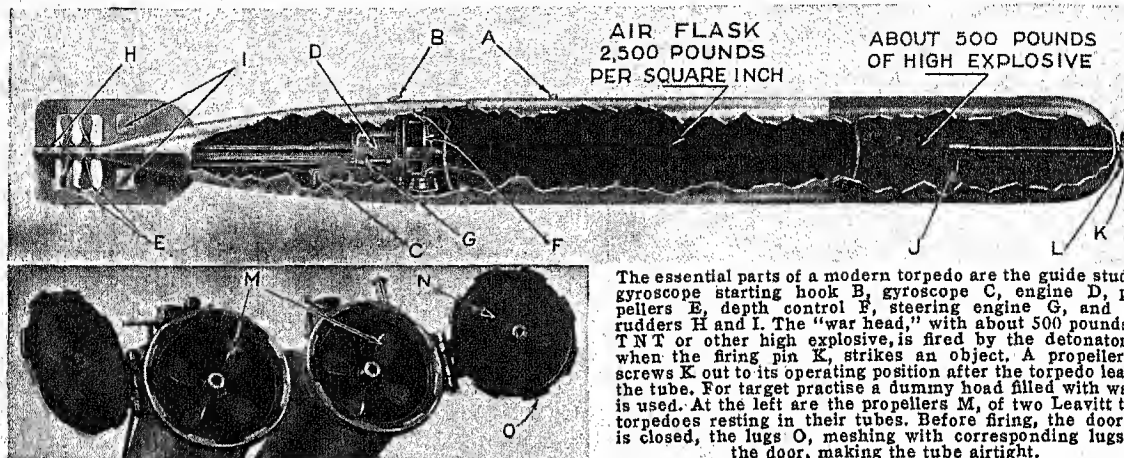


A gentle creature enough to look at, but you just touch him with your foot while swimming in southern waters and see what a shock you'll get! He's a Marbled Electric Ray Torpedo, and like the rest of the Torpedo-Fish family, has a system of electric storage cells on each side of his body near the head; and he's all "wired," too, ready for business!

modern torpedo speeds under water from the ship or airplane which launches it to its target.

The modern naval torpedo is an intricate cigar-shaped mechanism which costs \$10,000 or more. A ship fires it from a tube on deck; an airplane drops it while skimming the surface. In either case, the torpedo sinks to run at a level below the waves. A submarine usually fires torpedoes while submerged, at the level where they make their run.

HOW THE DEADLY TORPEDO IS MADE AND FIRED



The essential parts of a modern torpedo are the guide stud A, gyroscope starting hook B, gyroscope C, engine D, propellers E, depth control F, steering engine G, and the rudders H and I. The "war head," with about 500 pounds of TNT or other high explosive, is fired by the detonator J, when the firing pin K, strikes an object. A propeller L, screws K out to its operating position after the torpedo leaves the tube. For target practise a dummy head filled with water is used. At the left are the propellers M, of two Leavitt type torpedoes resting in their tubes. Before firing, the door N, is closed, the lugs O, meshing with corresponding lugs on the door, making the tube airtight.

The Whitehead "automobile" or "fish" torpedo, or a modification of it, is used almost exclusively in all navies of the world. The case or shell is from 18 to 22 inches in diameter and from 16 to 22 feet long. On the outside, in the rear, like the tail of a fish, are the propellers or rudders. The case is divided into three main chambers. The section nearest the propellers contains the engine for driving the torpedo, and the vertical and horizontal steering gear, which is equipped with a gyroscope for holding the torpedo to its course (see Gyroscope). The middle compartment, called the air flask or air vessel, contains compressed air for the engine and for giving stability to the torpedo. The front compartment, the "war head," contains the explosive charge and the primer, or detonator. On the nose is a firing pin, or striker. This is protected by a releasing screw that is not unlocked until the torpedo has been discharged.

How the Torpedo Is Fired

When a submarine prepares for action, the crew slide the torpedo into the torpedo tube, closing the inside door of the tube and opening the outside or sea door. When the commander presses a button, a valve is opened by electricity, and the torpedo is shot out by compressed air or a charge of explosive.

Then it is driven on its way by its own engine, at 50 or 60 miles an hour. Motive power is either compressed air or steam produced by burning alcohol and air. As the torpedo gets under way, the firing pin is unlocked. When this striker hits the target, it is driven back and explodes the charge in the head.

The maximum effective range of a torpedo is more than 4½ miles, but submarines seldom fire at a ship more than a mile distant, because of the ease of approaching for a close shot.

As early as 1585, again in 1730, and during the American Revolution and following years various crude torpedoes and mines were developed; but it was not until the Civil War that such devices came to the front as serious weapons. They were then widely

and successfully used for blockading channels and destroying ships, particularly by the Confederates. Until long after the Civil War they were all known simply as torpedoes. Those used by small boats often were called spar torpedoes, because they were carried on a long spar and thrust against the attacked ship for firing. The first automobile torpedo was produced in 1864 by Captain Luppis of the Austrian navy and Robert Whitehead, a Scottish mechanical engineer. This type was perfected later by addition of the Brotherhood reciprocating engine. During this period the American navy developed the Bliss-Leavitt torpedo, with a turbine engine.

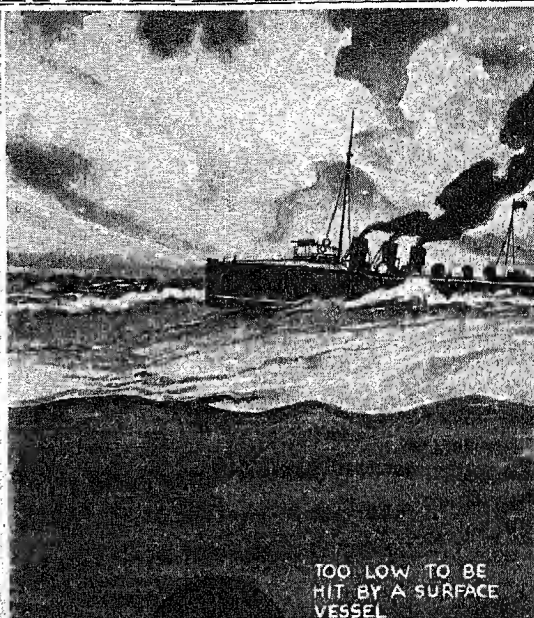
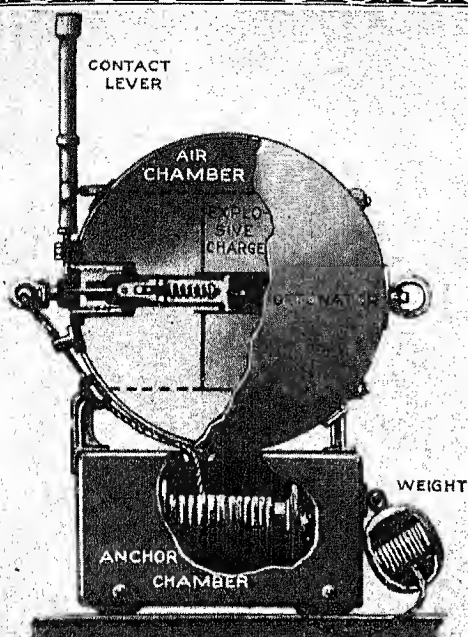
Various Types of Mines

The principal part of any mine is a cylindrical or spherical steel case, about three feet in diameter. The case holds enough air to make the mine float a few feet below the surface, and about 300 pounds of high explosive. An anchored mine has a cable attached to a heavy weight, which lies on the bottom.

The principal differences between mines are in the firing mechanism. A simple type of contact mine has a lever which moves when touched by a ship, and fires the mine. Another type has projections called horns. Each horn has a base which breaks when touched by a ship, and releases acid to fire the charge.

An antenna mine has one or more copper wires held above it by floats. Whenever a wire is touched by a steel ship, it fires the mine electrically, as explained beneath the accompanying picture. During the summer of 1918 the United States Navy, with British

THE GREAT TRAP FOR THE GERMAN U-BOATS



TOO LOW TO BE
HIT BY A SURFACE
VESSEL

ROW UPON ROW OF MINES TO
A DEPTH OF 240 FEET

U 13

LOW ENOUGH FOR
THE LOWEST
U-BOAT

In 1918, to keep the U-boats within the North Sea, the United States Navy laid a great barrier of mines clear across that ocean from Scotland to Norway, somewhat as shown. Each mine was held in place by an anchoring weight on the bottom and a tether. The most ingenious feature was the method of firing. Above each mine one or more floats held a copper antenna, not shown in the picture. When a submarine hit the antenna, the steel of the vessel, the copper of the antenna, and the sea water would generate an electric current which would fire the mine. The upper left-hand picture shows a typical mine, equipped with a contact lever which fires the mine if it is touched. Of course, the mines actually were laid much deeper than the picture can indicate.

aid, laid 70,117 antenna mines in an area 230 miles long and 30 miles wide, across the North Sea from the Orkneys to Norway. This barrage confined German submarines to the North Sea for the rest of the war.

The *magnetic* type of mine is fired by electromagnetic force when a metal ship passes near by. In one type, a compass needle is swung by the ship until it closes an electrical contact, and sets a current flowing to fire the mine. In another type, two electromagnets are opposed, and a control needle lies motionless between them until a ship passes. The metal of the ship destroys the balance between the magnets. The needle swings, closes a contact, and fires the mine. Such mines are suitable for use as *ground* mines, which lie on the bottom instead of floating where ships will hit them.

All such mines are *self-acting*, since they explode on contact. *Controlled* mines are fired electrically by wires leading from shore stations. An observer fires the mine whenever he desires.

Ships are perhaps best protected from mines by the *paravane*, a ship's "fender," an English invention of the World War of 1914-1918. It consists of a pair of cigar-shaped steel "ottors," connected by a cable 150 feet or so long, each otter bearing knives in front. The middle of the cable is attached under water to the bow of the ship. When the moorings of a mine are caught by either half of the cable they are forced along to the otter and cut by the knives; the mine then rises to the surface and is easily destroyed. Protection against magnetic mines is given by a cable or "magnetic girdle" which carries electric current around the ship and neutralizes or "degausses" the ship's usual magnetism.

Mines are removed from the water by sweeping or by countermining. Sweeping or dragging can be done best by two vessels, preferably steam trawlers. These steam abreast each other a few hundred feet apart dragging a heavily weighted cable, each ship having an end of the cable aboard, and the bight or sagging part of the cable sliding along behind, below the water surface. Mines are gathered in the bight and are then exploded by gunfire or otherwise. Countermining is the explosion of mines in a suspected area by means of other mines.

TORTOISE (*tôr-tîs*). Land turtles are often called "tortoises," and the name is at times given also to certain fresh-water turtles such as the terrapin, which are frequently called "marsh tortoises." The name comes from the Latin *tortus*, "twisted," referring to the creature's crooked feet. Zoologically there is little difference between turtles and tortoises, both belonging to the order *Chelonia* of the Reptiles. The tortoise-shell of commerce is produced not by the tortoise but by sea turtles, usually the hawksbill. It has the remarkable quality of becoming soft and

pliable when subjected to a heat equal to that of boiling water and of retaining when cold any shape which has been given it while soft. Pieces can also be welded together by the pressure of hot irons. Tortoise shell is used chiefly for combs for the hair but is much used also for inlay work in furniture and ornamental objects. (See Turtle.)

TOUCAN. The toucan is a bird freak, for it has an enormous bill larger than its head, shaped like a great lobster claw, and marked with bright colors. No satisfactory explanation has ever been given for this extraordinary feature. The tongue is also unusual, for it has side notches and is flat and feather-like; and the tail is joined to the body with a ball and socket joint, and can be raised above the back with a jerk. The black and green plumage is marked with white, orange red, or blue; and the eye, with a double iris of green and yellow, has a broad blue orbit and is surrounded by a patch of bare orange skin. There are 50 to 60 species, all natives of tropical America.

The common toucan, *Rhamphastos toco*, is about two feet long. It is most abundant in the Amazon valley; some species are found in Central America and Mexico. It feeds on insects and reptiles, and also eats bananas and oranges, often doing great damage to orange orchards. The nest of this curious bird is in a hollow tree; the eggs are white.

TOUCH. "How many senses have you?" The answer most people give to this question is "Five"; and they name

touch as one of the five. But a little experience and thought show there are really four separate senses localized in our skin. Often the sensation we get from contact with objects is a combination of two or more senses.

First there is true touch or "taet." This is aroused by light contact of any object with the skin.

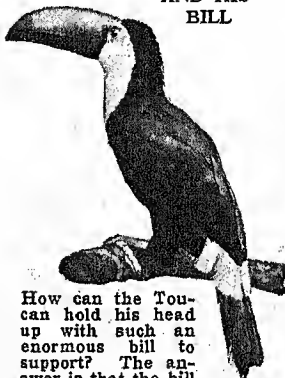
Second, there is the sense of cold aroused by objects of a lower temperature than the skin. This anybody recognizes as quite different from touch. Indeed it does not require contact of any solid object at all. If there is a cold object near by, we know it.

Third, there is the sense of warmth. This is quite distinct from both touch and cold and is felt when the temperature of the skin is raised.

Fourth is pain. This is caused by excessive stimulation or injury. Any sensation may become painful if its intensity becomes too great.

It can be shown by going carefully over a small area of skin with a light hair or wooden point that the touch sensation can only be aroused in certain small spots. This is because there are special nerve endings for touch and these are scattered closely throughout the skin. So too with the other senses; each has its own nerve fibers, its own pathways in the spinal cord, and its own center in the brain.

THE TOUCAN
AND HIS
BILL



How can the Toucan hold his head up with such an enormous bill to support? The answer is that the bill is extremely light. The outside is very thin and the interior is filled with a network of bony fibers which gives strength without weight.

You can test the sensitiveness of touch in several ways. For example, take a pair of compasses and find out how far the points need to be spread apart in order to be recognized as two. This is a good game for two to play at. One should be blindfolded. The other should lightly apply the compass points, one or both at a given moment. The first person should say whether he feels one or two points. See how many mistakes you make playing this game.

On the lips and fingertips you will recognize the two points when quite close. On the back of the hand or of the neck they must be quite far apart.

If one takes a cold blunt point, he can localize "cold spots." These are sensitive to cold but not to touch or heat. Heat and pain spots can be found by similar experiments.

The Sense of Location on the Skin

We are so used to being stimulated by contact in various parts of the body that we can tell pretty accurately what spot is being touched. This is called the "local sign." Another good game is for a blindfolded person to put a finger as exactly as possible on some spot another person has just touched with a pencil or toothpick. You will find that there is a good deal of difference in the exactness of localization on various parts of the skin.

Touch is important in giving us information in regard to contact, shape, smoothness or roughness, etc. You can "fool" the sense of touch if you get the endings out of their usual relation. For example, cross your fingers and feel of a marble or the end of a pencil. It will feel like two objects.

In addition to the four senses already named there is a sense of pressure, connected with the muscles and joints and the skin. By this we judge weights. By the so-called "muscle sense" one can tell the position of any limb pretty accurately. If the arm of a blindfolded person be bent by another person, the first can tell at about what angle the arm is bent.

In the blind the sense of touch becomes very important and can be cultivated to a high degree. Helen Keller, who was blind and deaf from babyhood, became a very wise and cultivated woman by learning to read and converse by the sense of touch. (*See Blind, Education of.*)

TOWNSHIP. When the Puritan Fathers came to Massachusetts they settled in little compact communities called "towns" or "townships." In each of these a meeting-house was erected for church services, and there the voters of the town also met from time to time in town meeting to make their local laws, elect their local officials—especially their "selectmen" or executive committee—and transact other business. The other New England colonies, as they were established, adopted the same form of local government.

In colonial Pennsylvania most of the duties discharged by the New England town meeting were assigned to the county governments. But still there were a few functions which could best be performed by officers of a smaller community, and so Pennsyl-

vania too adopted a "township" government. In this colony, however, no town meetings were held, for the township officials were elected at the general election and the administration of the township was left entirely in their hands. New York and New Jersey adopted a plan of township government midway between Pennsylvania and New England. In the colonies south of Pennsylvania, local government centered in the county and the parish.

In the new states north of the Ohio River and east of the Mississippi, and in the first tier of states north of Arkansas and west of the Mississippi, township government was adopted of the New York or Pennsylvania type. In the other states of the South and West there are no townships in the political sense.

In five other states that have township government—Ohio, Indiana, Missouri, Iowa, and Kansas—there are no town meetings, and the officials are elected by ballot at the time of the general election. In the other states which have townships, outside of New England, the officials are elected and the more important business transacted at a town meeting of the voters of the township, but these meetings are only faint shadows of their New England prototypes. The meetings are usually held in the spring of each year, but may be called at other times. The officers elected include supervisors or members of the executive committee by whatever name they are known, a town clerk, assessor, treasurer, constable, etc.

The functions of the township government include the building and upkeep of country roads, bridges, schools, etc., the administration of poor relief, and taxation for those purposes. Often the township officials will order you to cut the weeds along the road adjoining your property, muzzle your dog during the hot summer days, and keep your horses and cattle from running at large.

The people living in cities in most cases do not take part in the town meeting or in the township elections, for they are under municipal rather than township government.

The word "township" is also used in another sense, as a unit of the surveys of public lands made for the Federal government since 1785. Such townships are usually six miles square. In many states the boundaries of the political and the land survey townships coincide, but this is not necessarily true.

TOYS. Some kinds of toys have a long history, extending from ancient Greece and Egypt down to modern times. A baby is still entertained by a rattle; dolls; toy animals; and toy furniture are still popular for imitating grown-up activities. Children still like to play ball, as they did hundreds of years ago.

Toys Help Children to Develop

But many of our modern toys reflect our new understanding of how important it is that children have the right kinds of toys. For toys may aid the proper growth and development of children, or they may hinder. They are the tools that children use in their play—building, creating, dramatizing. Therefore

they should be carefully selected to suit children's interests, abilities, and needs at their successive age levels. (See Play Materials.)

Toys Come from Many Lands

The whole world is drawn on to contribute to the supply of toys for American boys and girls. At the annual toy fair in New York City, where manufacturers display their samples, may be seen dolls from France and a dozen other countries; doll dishes from China; and toy furniture from Japan. But in recent years, Uncle Sam has been making most of the toys for his children, and getting fewer from foreign lands.

For many years Germany and Switzerland made most of the toys for the whole world, for in both these countries there are whole communities that are entirely given over to toy-making. Imagine a whole valley where one family for generations has made rocking horses, another dolls' heads, another dolls' arms or bodies! Season after season buyers of toys were satisfied with the cheap wooden animals, tin mechanical toys, and pretty dolls made by these Old World workers. Then toy-makers began to experiment with more elaborate toys and even educational toys. The result was novelties of which the older generations had never dreamed. What would those earlier children have thought of a three-foot electrically-propelled cruiser with complete wireless apparatus; a fire truck that comes right up to the doll house and hoists its own ladder; a knock-down and assemble outfit from which a boy can make his own truck, tractor or automobile that will run on its own power; or an airplane that will fly three or four hundred feet on a single winding? Such toys as these, expensive though they are, have lessened the demand for Noah's arks, woolly dogs, and toy drums and trumpets; while Uncle Sam's character dolls, completely furnished two-story doll houses, real grocery stores, and workable "little-theaters" have largely replaced the long popular conventional articles of German manufacture.

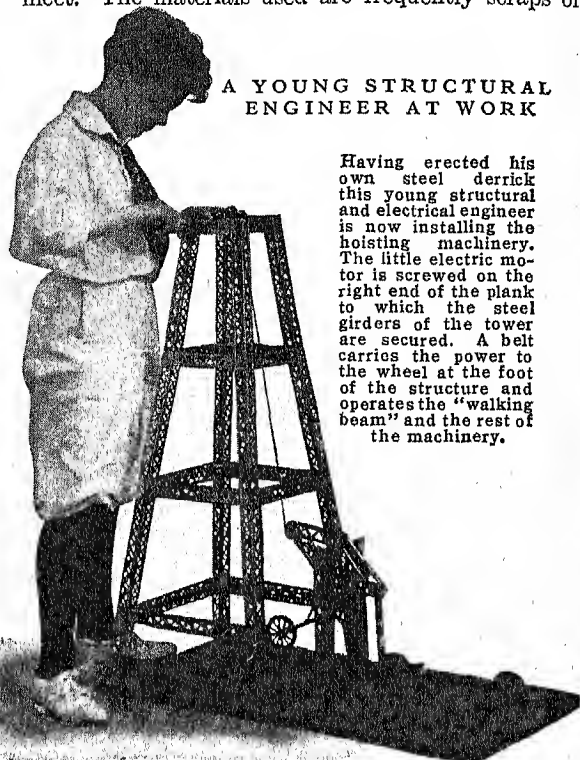
But this is only half the story. Uncle Sam now not only makes his own toys, but he has enough left over to send abroad. Applying modern

TOYS OF LONG AGO

These are some of the toys with which little Egyptian children played thousands of years ago—a toy fish, balls of seeds and of porcelain, chessmen, and a wooden doll, rudely painted with an animal figure. To the loving imagination of some little girl of that dim, far away Egyptian past, the peg at the top was the face of her own dear dolly.



factory methods to their making he is often able to sell his toys at prices which European hand workers cannot meet. The materials used are frequently scraps or



A YOUNG STRUCTURAL ENGINEER AT WORK

Having erected his own steel derrick this young structural and electrical engineer is now installing the hoisting machinery. The little electric motor is screwed on the right end of the plank to which the steel girders of the tower are secured. A belt carries the power to the wheel at the foot of the structure and operates the "walking beam" and the rest of the machinery.

by-products from other industries. Thus there is one toy factory that buys 60 different kinds of wood scraps and uses several car-loads a day; while in another which makes toy airplanes, the bamboo wing-ribs come from a factory that makes bamboo porch shades, and the wing silk is scraps from a large shirt-making establishment.

The United States now makes all kinds of toys. Some of these are mere figure or puppet toys, and others are miniature or model toys that range from furniture to steam engines. The activity toys include balls and skipping ropes, "push-mobiles," and elaborate playground equipment. The educational card games, sectional and puzzle sets, and games with counters are endless. Finally there are steel construction outfits, from which bridges, windmills, or even battleships can be built; and the sets of wheels, gears, axle rods, pinions, nuts, bolts, screws, and frame pieces, from which such varied toys can be made as a wheelbarrow, truck, coaster wagon, or two-wheeled coaster, all strong enough to endure the roughest kind of service a child can give them.

The history of toy-making goes back to the very beginning of the human family. Dolls, tops, balls, and rattles have been found in the most ancient tombs of Egypt. Jointed dolls moved by strings and small models of furniture painted with scenes of children's life have been found among ruins of ancient Greece and Rome, and every country and age has had its similar toys and games.

TRANSFORMER. You have often seen large iron cases attached to poles carrying electric wires, and perhaps in your rambles in outlying parts of your city you have run across huge boxlike affairs, twice as tall as a man, with wires running to and from them. These are electrical transformers. What are they for and how do they work? You can find out by a simple experiment.

Wind two coils of insulated wire around an iron core and send an electric current through one. A galvanometer will show that, at the instant the current starts through this first coil, a current in the opposite direction starts in the second, stopping instantly. This induced current in the secondary coil does not flow again until the current in the primary coil ceases to flow; then another momentary current is induced in the secondary coil, this time in the same direction as that in the primary coil. This is the principle of the *induction coil*, which is exceedingly important in the commercial utilization of electricity.

If, instead of a periodically interrupted direct current, an alternating current is passed through the primary coil, each change of current will induce a momentary opposing current in the secondary coil. When the number of turns in the windings of the two coils is the same, the currents are practically equal. Where there are ten windings in the primary coil to every one of

the secondary, the voltage in the secondary coil will be one-tenth that of the primary; where there is one winding in the primary coil to every ten in the second-

ary, the voltage in the secondary coil will be ten times that of the primary.

The coil with the more numerous windings is the high-tension coil; the other is the low-tension coil. The transformer with a high-tension primary coil and a low-tension secondary, receiving current at high voltage and delivering it at low voltage, is known as a step-down transformer; the reverse is a step-up transformer.

Aside from its use in electric power transmission, the transformer finds wide application in other ways, notably in radio communication (*see* Radio). In every radio set, for example, there are two kinds of transformers; these are air-core and iron-core types. The first handles the radio-frequency alternating current coming in from the aerial wire, the latter handles the slower alternations or impulses in the audio-frequency amplifier. An iron-core transformer can be made to handle high-frequency currents, but it cannot respond over as wide a range as the air-core variety. As might be expected, the air-core type has no iron inside the turns of wire.

A transformer is one of man's most efficient servants, for a good one loses only two or three per cent of the energy going into it. This loss is in the form of heat; so in large transformers the windings and cores are submerged in special oil which insulates the coils and cools them.

The spark coil in the automobile is a common form of transformer. The low-voltage current from

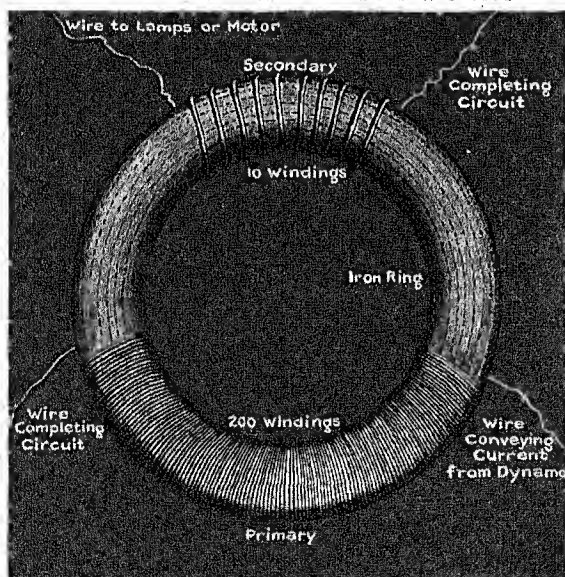
the battery is rapidly interrupted in its flow through the primary by a cam in the distributor, inducing a high-voltage current in the secondary which passes to the spark plugs. (*See* Automobile.)

GROOMING THE HOBBY HORSE



This rocking horse is being smoothed down on a sandcloth belt; later it will be painted and receive mane, tail, saddle, bridle, etc.

HOW THE TRANSFORMER WORKS



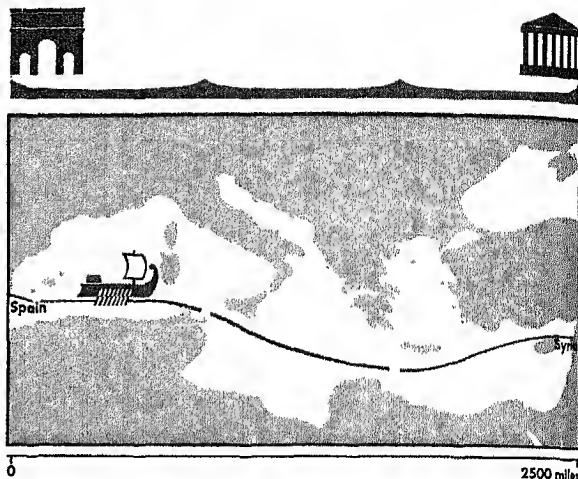
The primary wire is bringing a current of 2,000 volts, let us say, from the power station. The number of turns in its windings around the core is 20 times that of the secondary wire. The latter, therefore, carries to the lamps or motor 20 times the volume of current (amperage) at 1/20th the pressure (voltage), in this case 100 volts. The rule of transformers is that the same amount of energy (amperage \times voltage) goes out as comes in, minus the energy lost as heat.

How the Traveler's World Has Widened

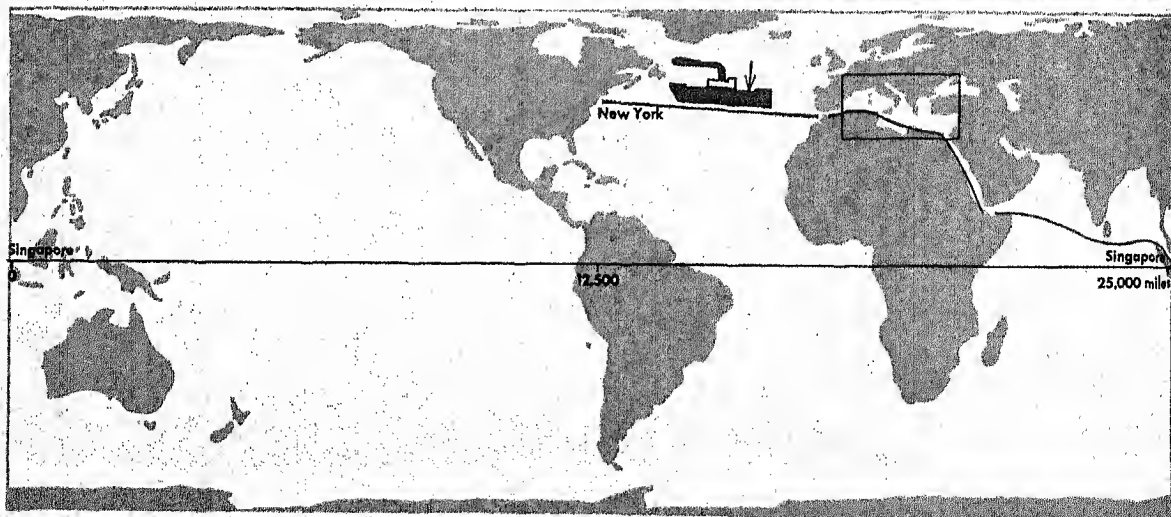
A Voyage of Three Weeks

In Roman days across the Mediterranean

The distances covered in three weeks by an ancient Roman vessel and a modern steamship are used here to show how greater speed has increased the traveler's range. It took a fast Roman galley, equipped with oars and a sail, three weeks to cross the Mediterranean Sea from Spain to Syria. The distance is 2,500 miles. A steamship of today can travel from New York to Singapore, or halfway around the world, in the same time. The blue lines indicating the routes of the two vessels are divided into sections, each of which represents a week's voyage. The little rectangle on the steamship's route encloses the Mediterranean area shown in the upper chart. Notice that the steamship crosses the Mediterranean in about four days.



Today half around the Earth



Each blue unit represents a voyage of one week
in Roman days: about 800 miles
today: about 4000 miles

TRAFFIC and TRAVEL by LAND, SEA, and AIR

How Ancient Men Had to Carry Their Own Loads—The Invention of the Wheel and the Training of Beasts of Burden—The Wonderful Influence of Ships—The Final Triumph of Self-Pushing Machines

TRANSPORTATION. Man was at first his own beast of burden. It was the woman, though, who did most of the actual burden bearing, as is still customary among primitive peoples. Simple devices were invented to enable a person to carry greater loads, such as yokes to suspend weights from the shoulders, tump-lines around forehead or chest to help support the load, and rude sledges for dragging loads along the ground.

When our Indo-European ancestors ages ago set out on their long migrations from their original homeland somewhere in central Asia, they carried or dragged their few possessions (see *Migration of Peoples*). In the course of centuries, after traversing seemingly interminable grasslands, or *steppes*, they came into a wooded country. Here, about 10,000 years ago, so scholars say, they took a great step toward civilization. They invented the wheel. At first this was probably a mere circular cut from a tree trunk, but it greatly increased the load that could be taken along and the speed of travel. We know this because the same word, variously modified, means "wagon" in the several tongues which have grown out of the Aryan parent language (see *Philology*).

The oldest wheeled vehicle in existence is a chariot discovered at Kish in Mesopotamia. It is reckoned to be about 5,500 years old.

Animals Trained to Carry Loads

By this time, too, man had tamed the ox and the ass and taught them to carry loads and to draw the wagon; we find records of their use in Egypt as far back as 2,700 years before Christ. The horse did not appear till later, and then it was used chiefly in war. It was introduced among the Babylonians about 2100 B.C., coming from the nomadic peoples of the grasslands far to the north. From Asia the horse was brought to Egypt about four centuries later, and

used to draw the war chariots of the pharaohs. In other climates and conditions, other animals were domesticated as beasts of burden. The camel became the "ship of the desert" in very ancient times. The elephant was trained for riding and to carry or draw heavy loads in the Far East. The llama became the pack animal of South America, the yak of Tibet, and the water-buffalo or carabao of the Malay Peninsula and the Philippine Islands.

Dogs were used by the Plains Indians of North America to drag their tent poles. Eskimo dog trains and reindeer still do the carrying in the Arctic regions. The ox-cart and the prairie schooner drawn by horses, oxen, or mules enabled white men to occupy the interior of North America.

Boats and Ships

But long before men had invented the wheel or had tamed animals, they had discovered that a hollowed tree trunk or the inflated skin of an animal could be easily pushed through the water by a flat piece of wood (see *Boats and Boating*). The earliest civilizations therefore were developed along rivers and bays where this mode of transportation was available. It did not take men long to improve on the hollowed log and to build

boats and ships of some size, and to fit them with sails. In the very dawn of Egyptian civilization, ships came into use on the Nile, and the pharaoh's subjects even ventured out upon the open Mediterranean, to trade or to make war (see *Ships*).

By 1000 B.C. the Phoenicians had succeeded the Egyptians as a seafaring power, and the Mediterranean was alive with their swift galleys, carrying purple garments and ivory combs and jewelry among the new Greek settlements. The Greeks, too, were driven by the poor soil of their land to turn to the sea for a livelihood; and within a few centuries their trading vessels were known in every inhabited bay

THE OLDEST WHEELED VEHICLE



In a large tomb on the site of the ancient city of Kish in Mesopotamia, archeologists in 1927 uncovered a four-wheeled chariot of the Sumerians some 5,500 years old. Attached to the pole was a copper rein-ring surmounted by a copper bull figurine, and between the shafts lay the skeletons of oxen. These earliest known wheels were made of sections of wood joined with copper nails.

or inlet of the Mediterranean basin. Then the Roman galleys in their turn swarmed over the inland seas and along the coasts of Africa and Europe, followed still later by the ships of Venice, Genoa, Florence, and other wealthy city-states of Italy which rose to power on the ruins of the Roman Empire. These early mariners sailed by landmarks and the positions of the stars; so they dared not venture far from land. Not until the invention of navigating instruments was it possible to steer boldly out into the open ocean (see Navigation).

Waterways Influence Course of History

The development of means of transportation is an important part of the story of civilization (see Civilization). The backward peoples are the isolated peoples, who have not the means of coming into contact with others. Without the magnificent roads which the Romans built all over the territories they conquered, there could have been no Roman Empire. It was by the waterways that Europe has expanded to the far corners of the earth. It is the waterways which, more than any other geographic factor, have determined the

direction and the character of significant historic movements. Sea power has always been the basis on which great nations have been built. Nearly all the important cities of the world—London, New York, Chicago, Hamburg, Constantinople, Vienna—owe their being mainly to their advantageous position on waterways, which still are the cheapest means of transportation. The greatest handicap of some Central and South American states is lack of railroads and steamships. The railroad mileage of a nation may be taken as an index of its material advancement.

When Travel was a Perilous Adventure

To the development of transportation is largely due the enormous economic revolution that has taken place in Europe and America since the 18th century. Before that time travel was a difficult and daring enterprise, more so than it had been in the days of the Roman Empire, for after the fall of Rome the roads had been allowed to decay. Most roads were mere cart-tracks worn into deep ruts and so deep with mud in bad weather that for half the year wheeled vehicles could hardly be dragged through them. In France, when the famous Madame de Sévigné in 1671 set out by carriage to visit her daughter, 200 miles

away, she made her will and regarded the undertaking as far more hazardous than we today would regard a journey around the world. And in England there was so little travel that a writer in the early part of the 18th century said: "It is scarcely half a century since the inhabitants of the distant countries were regarded almost as different from those of the capital as the natives of the Cape of Good Hope. Their manners, as well as their speech, were entirely provincial." (See Roads and Streets.)

In the middle of the 18th century, England entered the modern era of transportation with the construction of great numbers of good hard roads radiating from London in all directions. Canals, too, were

made for the transporting of bulky goods, like coal and iron, to supply the great new manufactures which were springing up with the development of factories and steam power (see Canals). Similar changes took place on the Continent and in America.

Transportation in the American Colonies

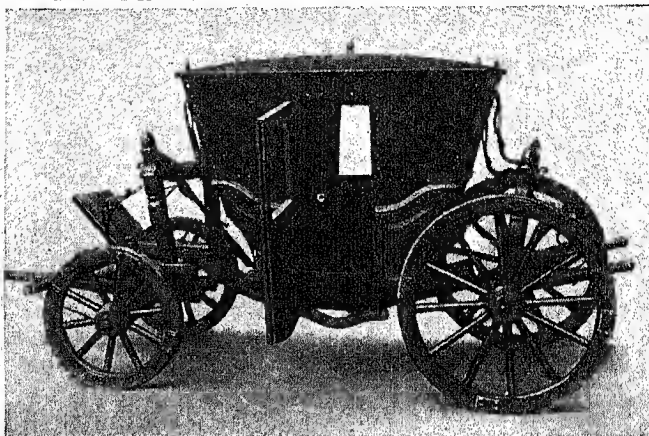
For over a hundred years, the means of transportation in the American colonies were few and simple. Since the highways at

first were the streams and the Indian trails, the colonists either used boats or walked. They at once adopted the birch-bark canoe of the Indian as well as the "dugout," a hollowed tree trunk (see Canoes). Later, they built flatboats, heavy rectangular craft with straight sides about four feet above the water line. Oarsmen had seats near the front, and a small cabin at the stern afforded shelter for long trips.

On farms, the powerful ox was generally used to drag a roughly fashioned cart. Sometimes the two wheels were simply cross-cuts from a large tree trunk. The early settlers also used the Indian "travois," a pair of poles, drawn by horses; as well as "drags" and sleds of forked tree limbs and split logs. By the early part of the 18th century sleds were equipped with runners banded with iron rims. Transportation of weighty goods was sometimes postponed until snow and ice covered the ground. The historic Nantucket fishcart was merely a barrel on wheels; and the "tar-barrel" cart of North Carolina was made of two barrels resting on an axle.

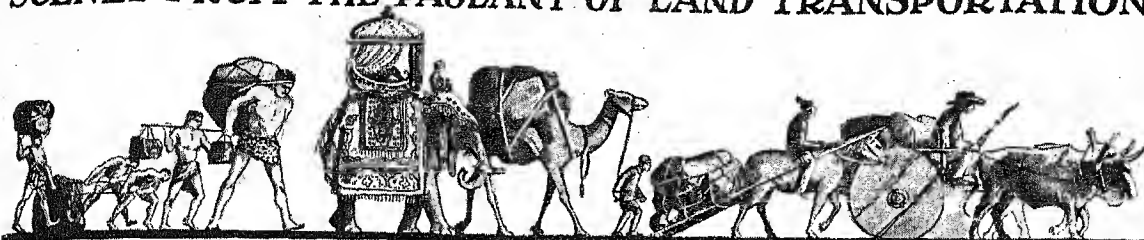
Travel in this early period was principally by horseback. If the wife of a pioneer accompanied him, she rode on a "pillion," or cushioned seat back of the saddle, to which it was fastened. When four persons

THE FAMILY COACH OF WILLIAM PENN



A rather crude conveyance, this coach which carried a great colonial leader! The body is hung on leather straps attached to the uprights, and other straps from the uprights to the top of the body act as snubbers when the coach hits a rut.

SCENES FROM THE PAGEANT OF LAND TRANSPORTATION



His own two feet gave man his first transportation and his back was the first freight carrier.

For centuries the elephant and camel have carried burdens, as they do today in the East.

Two poles, with a load lashed between them, and dragged by a horse, formed the Indian travois. Clever was the man who first sliced a tree trunk and made a cartwheel.



Wild chariot races thrilled the Roman mobs, and battle chariots helped win wars.

In the snowy North nothing can take the place of the sledge. Prancing reindeer draw sledges in Lapland. Elsewhere teams of loping dogs do this hard work.

Three horses abreast, with tinkling bells, draw the troika, an unusually graceful form of sleigh which is peculiar to Russia.



The Chinese put sails on wheelbarrows long ago to help push loads.

Rickshaws pulled by men are common in the Far East and South Africa.

Ladies in powdered wigs rode in dainty sedan chairs until the end of the 18th century.

The Lord Mayor of London still travels on state occasions in this carved and gilded coach of 1757, typical of its day.



Before the coming of the railroad, the boat-shaped Conestoga wagon was one of the principal freight carriers in the eastern part of the United States.

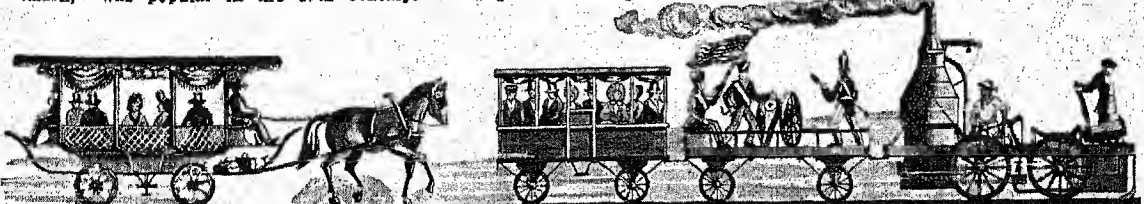
Journeys were spiced with jolts, upsets, and highwaymen, when the Overland Stage rolled away to the West. Fast it often galloped the riders of the Pony Express, bearing valuables and letters marked "Haste, post haste."



The springy calèche, either two-wheeled or four-wheeled, known in the New World as the "calash," was popular in the 19th century.

Paddling along on the dandy-horse (left) was little better than walking. Bicycling really began with the high-wheeled "ordinary."

We smile at the first "horseless carriage," but it scared our fathers, a few years ago.



Unhurried were the days when Dobbin pulled the first little street cars. Only after fierce debate was he supplanted by cables or electric power.

Flags waved, guns boomed, that reckless day in January 1831, when the "Best Friend" set out on a formal run. It was the first practical American-built locomotive. A brush at the front swept obstructions from the rails.

made a journey with but one horse, they used the "ride and tie" plan. Two would ride for a mile or so as the others walked. Then the first riders would tie the horse and walk on while their companions would overtake the horse, and in turn ride on ahead.

Wagons and carriages of various types came into use with the building of roads, which by about 1750 linked the principal settlements and cities. At the beginning of the 18th century there were only 30 wagons, carts, and similar vehicles in Philadelphia, and a few more in New York, Boston, and in southern settlements. The most common means of transportation in the later colonial period was the stage-wagon; its boxlike body, resting directly on the axle shafts without springs, carried four seats—plain boards, with a back only for the last seat, which was usually reserved for the ladies. Uprights at the corners supported a slightly curved roof, and leather curtains could be rolled down to keep out snow and rain.

Afoot, on horseback, and in wagons, the colonists fought their way inland along the Indian trails through the forests and across the far-reaching prairies. Ox-carts bumped over treacherous trails and floated on rafts across streams. The Spanish type, popular in the American Southwest, was a high-wheeled cart, made entirely of wood, even to the pins that held it together. A single ox drew each cart.

Early Roads and Trails

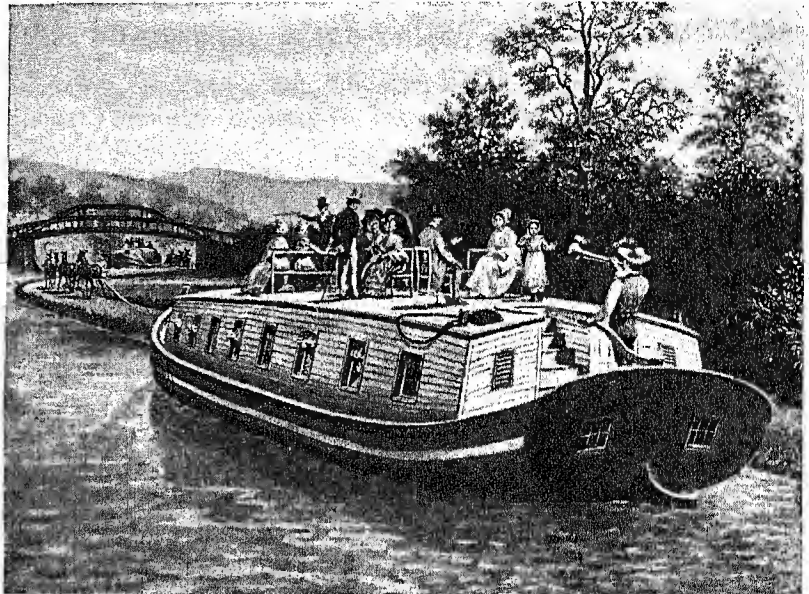
Roads developed slowly, because the large towns were on or near the seacoast, and coasting ships furnished transportation between them. Trails were considered good enough for postriders and farmers who traveled by land. The first improvements were *blazing* the trails by slashing patches of bark from trees with an ax to mark the way, and clearing out stumps to make a path wide enough for a wagon. Work of this kind marked the start of the "Common Road" between Boston and Providence in 1654, and other noted colonial roads (see *Roads and Streets*). Trails extended from Boston as far as Savannah by way of New York, Philadelphia, and Baltimore.

Beginning of Stage-Coach Service

Stage-coaches did not come in until 1774, when the first stage-coach service was begun between Boston and New York. With the building of turn-pikes, or toll roads, which began in 1794, regular stage-coach service connected all the larger cities (see *Roads and Streets*). A widely used type of coach was

called the "Concord," so named because many were built at Concord, N. H. Each corner of the rectangular frame, securely braced, carried an upright with a shackle. There were no springs, but the body was swung on thick leather pieces attached to the uprights. The body was inclosed, with a door in the center of

BOATING ON THE ERIE CANAL



In the 1830's and 40's a tour by canal boat was very fashionable. Shallow boats, drawn by horses trotting along a tow-path, made 15 miles a day. In the front cabin of these luxurious craft were sleeping accommodations, the men's and women's quarters divided by a curtain. In the after-cabin meals were cooked by the boatman's wife.

each side. The floor was slightly curved, as was also the roof. The driver's seat outside was placed high. Coaches were sometimes drawn by several pairs of horses, and frequently a postilion, a rider on the near wheel-horse, drove the team, or aided the driver.

"Philadelphia to Pittsburgh in 20 days!" In 1800, that was good speed. At night travelers stopped at coaching inns, which provided food and drink while the travelers entertained themselves with songs, stories, and gossip. At dawn the coach resumed its journey, and during brief pauses at taverns in the course of the day horses were changed.

The Conestoga wagon, named for the Pennsylvania region where it developed, was one of the chief freight carriers of the East from about 1750 until the coming of the railroads. It was built with a boat-shaped body so that the load would shift less easily on hills. With its red sides, blue underbody, and white canvas cover, it presented a gay appearance. Broad wheels kept it from getting stuck in the mud. Usually six horses pulled the heavy loads. The driver rode the left horse of the last pair or sat on a lazy-board projecting slightly to the left near the front of the wagon. Similar to the Conestoga wagons, but with straight boxlike bodies, were the "covered wagons," or "prairie schooners," which carried emigrants west and over the Rockies from 1830 on.

Colonial America was heavily dependent on England for its manufactures, and so ocean transport was of vital importance to the pioneer Americans. New England produced a race of sturdy seamen who plowed the seven seas in sailing ships on trading voyages that often lasted two years or more. New England ships developed a triangle of trade by which they carried rum to Africa and traded it there for slaves, whom they carried to the West Indies and exchanged for sugar and molasses. Then they came back to trade their molasses again to the rum makers. Cargoes of lumber and foodstuffs also provided a direct commerce with the West Indies. American trade was pushed to the Far East as early as 1784; that year the *Empress of China* left New York for Canton, the first American vessel to attempt that voyage. In the 1840's American builders developed the famed clipper ships, the fastest sailing ships that ever rode the seas. The steamboat drove even these picturesque voyagers to oblivion. (See Ships.)

Inland water transport grew as the frontier moved westward. As early as 1785 a canal was built in Virginia from Richmond to Westham, around the falls in the James River. The Dismal Swamp Canal, connecting Chesapeake Bay and Albemarle Sound, was finished in 1794. Other canals were rapidly constructed; some to skirt dangerous rapids or falls, others to connect existing waterways. The Middlesex Canal of Massachusetts, linking Boston Harbor and the Merrimack River, was finished in 1808, at a cost of about \$500,000.

In 1825, when the Erie Canal was completed, it cost \$100 a ton to move freight from Buffalo to New York, and it took 20 days. The same load was moved down the canal in eight days, and for only \$10. Commerce and travel leaped to this faster and cheaper means of transportation. Fast horses pulled passenger boats fitted with the luxuries of the day. The canal made New York City the center of ocean shipping, banking, and the middleman's trade. Boston, Philadelphia, and Baltimore started canal projects to win back their waning commerce. Canals were started all through the Middle West, but the railroad's flying wheels sped the country out of the "Canal Era" so quickly that unlucky investors lost nearly \$100,000,000 in abandoned canals (see Canals).

The Mississippi Steamboats

From 1830 to 1860 was the golden age of travel on the Mississippi River. Log rafts, flatboats, and keeled boats floated down the river, loaded with manufactures for the inland and with the farmers'

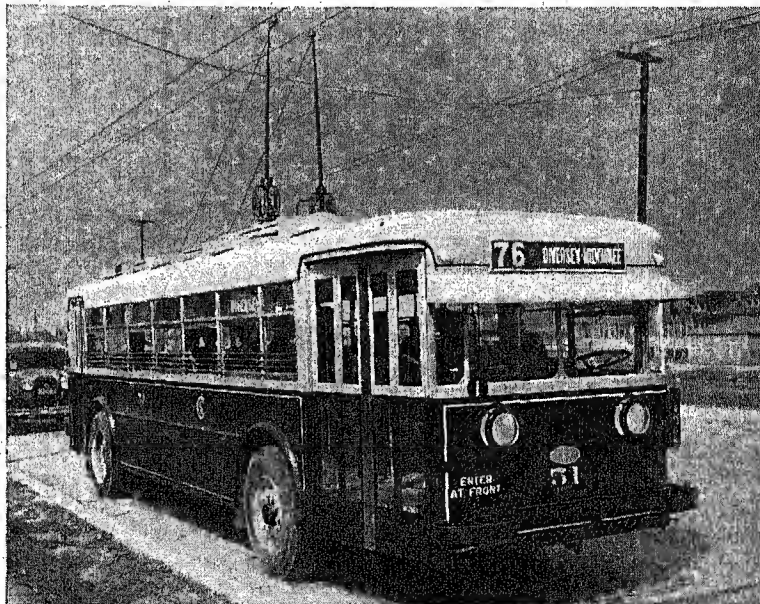
pork and grain for the great export market at New Orleans. St. Louis, Cincinnati, and Louisville were the chief cities on the route. Because of the strong current, up-river traffic was almost impossible; so rafts or boats were broken up at New Orleans. The farmers spent months coming back on foot or horseback, or took ship to an Atlantic port and came home overland. The Supreme Court decision of 1824 in the case of *Gibbons vs. Ogden*, which abolished transportation monopolies in navigable waters, cleared the way for steam vessels to take over all transportation on the great rivers and create the picturesque, rowdy "steamboat life" of 1825-1861.

Inland water routes still hold their place for bulky freight which can be moved slowly. (See Great Lakes; Mississippi River; Rivers and Inland Waterways.)

When Steam was Put in Harness

The modern industrial era passed into its second phase with the introduction of the steam railroad and the steamboat in the first half of the 19th cen-

A TRACKLESS TROLLEY OPERATED BY ELECTRICITY



This cross between a trolley car and a bus needs two trolleys, since the current has no return through the ground. Its path may vary by 14 feet on either side of the trolley wires. Its control works like an automobile accelerator and it has four air-brakes.

tury. Then for the first time in history transportation became so cheap and speedy that it was possible to draw on all parts of the world for raw materials and to bring them together at convenient centers for manufacture, and to ship the manufactured articles wherever there was a demand for them.

The completion of the first transcontinental railroad in the United States (the Union Pacific), in 1869, was a milestone in the nation's history. It marked the beginning of a new era in western expansion, when settlers poured into the vast undeveloped region that stretched between the Mississippi Valley and the Pacific states, and new cities sprang up; and

it bound the East and the West in "a band of steel that would never be broken." Other lines to the Pacific were built, making all parts of the Far West accessible to settlement and business enterprise, and the railroad finally welded all America into one great economic unit.

The supremacy of the railroad was not achieved, however, at one sweep. For years, the old and new transportation methods existed side by side. (See Railroads.)

Western Trails of Early Days

Up to 1850, there were only about 9,000 miles of railway lines in the United States. Between the Middle West and the Pacific, travel was by foot, horse, or ox team.

The Santa Fe Trail across the Great American Desert was traveled by fur traders as early as 1804; and by 1821, trains of pack horses and wagons used it regularly. Stage-coaches began covering this 850-mile route from Independence, Mo., to Santa Fe about 1849. The famous Oregon Trail saw the start of heavy overland transportation to the Pacific in 1830, when a caravan of some 200 covered wagons moved out of St. Louis, and headed over the Rockies.

The Oregon Trail and the Mormon Trail to Salt Lake City carried most of the overland travel to California in the gold rush of 1849. In the 1850's, the first stage lines between St. Louis and San Francisco charged \$100 for the 21- to 23-day trip. Between 1843 and 1857 at least 350,000 emigrants moved west over the Oregon Trail. Disease claimed thousands of the travelers; epidemics of cholera killed uncounted numbers. (See Far West.)

The famous "pony express" started in April 1860. For 19 months it carried mail between St. Joseph, Mo., and San Francisco by way of Sacramento. Daring, skilful riders rode swift, hardy little ponies at top speed, changing mounts at 190 stations along the 2,000-mile route. The trip took eight to ten days. Many riders were shot from their saddles by Indians; and pioneer tales tell of ponies galloping riderless, but with the mail intact, to the next station.

Express service in the United States had been started in March 1839, between Boston and New York, by William F. Harnden, a conductor on the first New England passenger railroad. By agreements with ocean lines, he developed international service.

The First Street Railways

The first street-cars were run in 1832 in New York City. They were pulled by horses. Railroad lines

also were given a right-of-way on elevated lines run overhead, or in subways (see Tunnels and Subways). New York had the world's first "L" line, opened in 1868 with small steam locomotives as power. The earliest successful electric lines were put in service in 1888 (see Street

Railways). Work started on the world's first subway, in London, England, in 1853; it was not ready for service until ten years later. Steam locomotives pulled the cars. America's first subway was started in New York in 1900 and put in service in 1904.

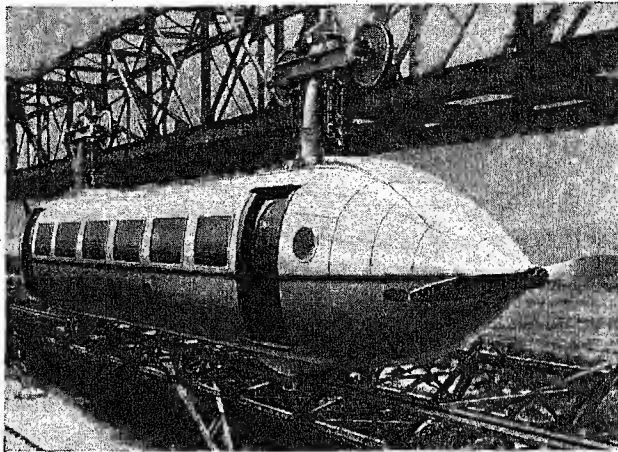
The supremacy of the railroad as the common carrier is today being challenged by the automobile, the motor-bus and truck, the airplane, and even by steamships which

are taking freight through the Panama Canal at cheaper rates than the railroads can offer. Busses and trucks are public carriers in cities, between cities, and across the continent. Great fleets of trucks haul freight to regions the railroads cannot serve (see Automobile). Airplanes are carrying passengers, mail, and even freight at speeds impossible to surface carriers, and over airways as carefully charted and as well managed as the railroads (see Airplane).

Street railways continue to lead the bus lines in urban transportation. However, both steam and street railways are using busses wherever trackage cannot be made to pay for itself. The "trackless trolley," a recent invention, is an experimental effort to replace the old type of street-car. (For further study, consult the Reference-Outline on Industries and Industrial Arts.)

TRANSVAAL (*trāns-vāl*). A province of the Union of South Africa between the Vaal River on the south and the Limpopo on the north, separated from the coast by Portuguese East Africa. This region was settled by the Boers who trekked northward from Cape Colony after the British had issued their edict emancipating the slaves in 1834. There were various conflicts with the natives, especially the formidable Zulus, and with the British. These latter led to a temporary annexation of the Transvaal by the British in 1877. A British-Boer war which followed in 1880 saw the defeat of the British at Majuba Hill in 1881; following which the independence of the Transvaal was restored, except for British suzerainty over its foreign relations. More formidable difficulties resulted when gold was discovered in the famous Witwatersrand, in 1884, and foreigners (Uitlanders)

A CAR THAT RUNS ON ONE RAIL



This "railplane" in Scotland can make 120 miles an hour. The bullet-shaped car, driven by an airplane propeller, is suspended from a mono-rail track and steadied by another track below.

flocked in by thousands. Oppression or denial of political rights to these immigrants, under the administration of President Paul Kruger, led to an unsuccessful raid from the British South African territories, headed by Dr. Leander Jameson in 1895. After prolonged negotiations, the three-years' Boer War (1899-1901) followed (see Boer War). By the peace of Vereeniging the Transvaal became a British colony. Self-government was granted in 1906, and in 1910 it became a part of the newly formed Union of South Africa (see South Africa). The government is carried on by an Administrator and a Provincial Council.

The Transvaal is exceptionally rich in minerals. Besides gold, the chief source of wealth, there are diamond, coal, copper, iron, lead, and silver mines. The country is well adapted to agriculture, and stock-raising is still carried on extensively by the Boers, who comprise about half of the white population. Corn and tobacco are the chief crops. The largest city is Johannesburg (population, about 520,000), the center of the great Witwatersrand gold fields. Pretoria (130,000) is the capital of the province. The area of the Transvaal is 110,450 square miles; population, about 3,350,000, of whom 820,000 are whites.

OVER WILD TRAILS *with the* TRAPPER

Adventurous Life in the Far-Away North when the Bitter Winds Howl and Snow Covers the Ground—Making the Lonely Rounds of the Traps—Prices Paid for Pelts—Amateur Trappers on the Farms

TRAPS AND TRAPPING. Soon after the leaves begin to turn in the fall, thousands of sturdy woodsmen take the trail into the remote valleys of the Rockies or the Coast Range, into the woods of the northern states, or into the great lonely places of the Far North. Even before that, the Indians and halfbreeds of Canada have packed their worldly belongings into canoes, visited the trading-post of the Hudson's Bay Company, got an advance of money and goods to carry them through the winter, and paddled off toward the arctic cold. These are the soldiers of fortune who supply a large part of the furs that adorn our garments and keep us warm in winter.

When they get to their wonted trapping grounds—the white men one by one, the Indians usually in family groups—the trappers build a permanent camp and make things as comfortable as possible against the days when blizzards rage and the thermometer sinks to 50 or 75 degrees below zero. The animals are now beginning to grow their thick winter coats. Up to this time their fur is thin and almost worthless. When the first heavy snow falls, the trapper starts out, loaded with steel traps—as many as he can carry. Scanning the tell-tale foot-prints in the snow, he sees that here a fox has passed, there a mink, in another place a marten. At likely places he baits and leaves his traps—light ones for the smaller animals, heavy ones for the larger animals. So he swings around in a wide circle until all his traps have been set, sometimes a hundred or more. Then comes the daily work of making the rounds of as many traps as possible, to remove the animals that have been caught, to rebait those that have been robbed by animals too crafty to be taken, and to shift those untouched to likelier places. And when the rounds have been made, there still remains the work of removing and drying the skins. (A picture of a typical trapper's camp will be found with the article *Furs and Fur Trade*.)

Thus the trapper spends his lonely days during the winter months, pitting his skill and endurance

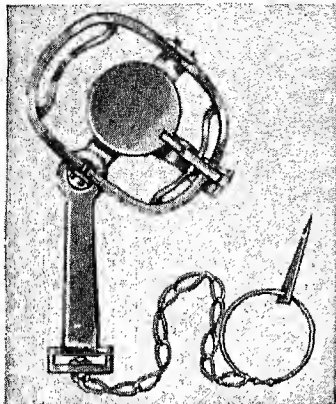
against the forces of nature and the cunning of the animals. Some years he is lucky; other years he may find that a great plague has swept his territory almost bare of fur animals, or that they have migrated to other grounds. Sometimes terrible storms rage, completely burying his traps. Then he must remember from landmarks where each one is, dig it out, and reset it. A hard life, and not a highly profitable one, for the trapper gets only a small fraction of the price you pay for a finished skin or fur garment; but it appeals to the red-blooded and adventurous, and so long as there are fur-bearing animals there will always be men ready to risk their lives to take them.

Various Ways of Capturing the Game

There are many ways of trapping or killing animals, but most of our furs come from animals taken in steel spring traps. In Russia shooting is still the common practice, but this is a wasteful method, since the shot or bullets always damage the skin more or less. For taking great animals alive—especially tropical animals such as lions and tigers—pitfalls are used, or trap-doors in which the animal as he crosses the threshold or touches the bait releases a trigger that drops a gate in place. Birds and sometimes other animals are snared with slip-knots. Dead-falls are traps in which a heavy log or other weight drops and crushes the animal when he touches the bait. Sometimes guns are set to be discharged by a line attached to the trigger. The Alaskan Indians have a knife-trap, in which a heavy blade attached to a lever pierces the victim when he touches the bait. Poison is also used at times.

The steel spring trap is the most effective and also the most cruel device. Some states have passed laws requiring the use of more humane traps. The steel spring trap has two jaws, with or without teeth; it is closed by powerful springs when the animal steps upon a small "pan" between them. To prevent trapped animals from carrying the traps away, they are attached by a stout chain to a tree or stake. Traps

for smaller animals are often attached to the tip of a sapling which is bent down and held in place by a notch on another sapling. When the animal is trapped



Here is a steel trap, "set" for its victim. A light tread on the central "pan" releases the catch; the great spring to which the chain is attached flies up, forcing the jaws together.

its struggles release the sapling, which flies up and carries trap and animal out of reach of other animals which might devour it. This also makes it harder for the animal to gnaw his own leg off, as he often does if the trap is left on the ground. Traps for powerful animals are usually attached to a pole, so that the victim can drag it about for a

time. This makes it harder for the animal to break the trap by pulling, or to wrench itself free.

So wary and cunning are many animals that great pains are taken to destroy all traces of human presence and to make everything look as natural as possible. Sometimes the traps are handled only with gloves, and scents are smeared over them and dragged over trails leading to the traps.

How the Skins are Removed

Skinning the animals is an important and difficult task. This must be carefully done, as the pelt is less valuable if it is damaged. Usually in cold countries the animals are frozen when they are taken from the traps and must be thawed out before they are skinned. The skins of small animals are usually removed "closed." In doing this the skin on the underside of the hind legs is split up the leg, across the body, and down the other leg. The skin of the tail is worked off the stump without cutting and the skin of the body is "peeled" much as a glove is taken off. The skins of the larger animals are cut from the throat the full length of the body. Then the pelt is scraped to remove flesh and fat, and stretched on a board to dry.

When the ice breaks up in the streams and they begin to run brown, and when the animals start to shed their warm winter coats, then the trapper knows that it is time to pack up his pelts and take them to market. If he is in the Far North, he makes for the nearest trading-post, where experienced dealers examine his stock and offer him what it is worth—from a few cents for the smaller and less valuable pelts to \$200 or \$300 for a fine silver fox. If there are no posts of the big fur companies near, he sends his season's catch to a dealer in St. Louis, where they are disposed of at great

auctions held every summer. Muskrat skins make the biggest item in the average trapper's catch, for although they bring only about 50 cents apiece, these animals are plentiful in nearly all parts of North America. For a blue fox the trapper gets about \$50, for a fisher \$20, for a timber wolf \$15, and so on down to the rabbit, which brings him only about 10 cents.

The professional trapper, however, has no monopoly on trapping. On countless farms all over the country boys and girls and even men find sport in trapping foxes, skunks, raccoons, weasels, and other animals. The pelts, properly dried, are traded in at the store for food or clothing. At the end of the season the country merchant sends the stock he has accumulated to a dealer at St. Louis or some other large city. (See also Furs; Hudson's Bay Company.)

How to Make a Simple Trap

A good trap for rabbits and other small animals can be made from a medium-sized dry-goods box. First dig a hole in the ground just large enough to admit the box, and deep enough so that only about 12 inches of the box appears above the surface. In each end of the box, level with the ground, cut a hole about 6 inches square.

Into each one of these holes you now fit loosely a narrow box about 18 inches long, in such a way that one-third of its length projects inside the big box. From the top of the big box, midway between the two

"THAT'S SURE TO CATCH HIM"



Placing their trap in the mouth of the groundhog's burrow, these amateur trappers feel confident that the farm pest will not plague them much longer.

entrances, you hang the bait so it is visible through the smaller boxes. Then you disguise the outside of your trap with branches, or leaves, or snow.

Along comes Mr. Rabbit. He smells and sees the bait, and apparently all he has to do is walk into one end of the tunnel, eat his fill, and walk out the other end. But as soon as he puts his foot on the inner

FINE FURS FROM THE FAR NORTH



Here is a trapper's winter catch, brought to one of the distant trading posts of the Hudson's Bay Company, the greatest fur-trading organization in North America. Here are magnificent silver fox skins (both of the men in the foreground are holding silver foxes), white foxes, otter, ermine (the small skins with black-tipped tails, at the left, are ermine), and almost every kind of fur known to the north.

end of the entrance-box, it tips up and drops him inside. The entrance-box then tips back into place, and the rabbit can't find any way out. A door for taking out the captured animals should be cut in the top of the big box.

TREATIES. Treaties are compacts or agreements between two or more states, much like contracts between individuals. They can be made, however, only by sovereign states. Thus the states of the United States cannot make treaties with a foreign power, or with one another without the consent of Congress; and the colonies of Great Britain and other countries are likewise restricted in their treaty-making power. The constitution and laws of every government determine in whom the power of negotiating treaties resides. In most European countries it resides alone with the executive or king. The constitution of the United States, while leaving the negotiation exclusively in the hands of the executive, provides for ratification by the Senate, "two-thirds of the senators present" concurring.

The most important class of treaties is political. Nations are created or destroyed, or their boundaries changed, by the treaties of peace by which countries settle their differences at the end of wars, as in the case of the treaties of Versailles, St. Germain, and Sèvres which ended the World War of 1914-18. Another class of treaties which have been important in making history are those forming alliances or leagues, such as the alliance by which France agreed to aid the United States in its war for independence

in 1778. Usually alliances are ostensibly defensive, the nations agreeing to aid one another only in case of attack, as in the famous Triple Alliance of Germany, Austria, and Italy; and the Triple Entente of France, Russia, and Great Britain on the other side. Treaties of arbitration have become increasingly important—some for the settlement of particular disputes, as in the famous *Alabama* Claims (see 'Alabama' Claims), and others which provide for the peaceful settlement of any "justiciable" dispute which may arise (see Arbitration). Other political treaties determine boundaries, cede territory, or guarantee the maintenance of certain conditions, as the neutrality of Belgium and Switzerland or of the Suez and Panama canals. Agreements to mitigate the horrors of war have been incorporated in various treaties.

The increasing interdependence of nations has resulted in the growth of an enormous body of treaties relating to many subjects which are not political—tariff duties, fisheries, the slave trade, the extradition of criminals, postal laws, telegraphs, submarine cables, weights and measures, monetary standards, etc. These agreements are often distinguished from the political treaties by the name "conventions," but this distinction is not always observed. Many of these conventions have resulted in permanently organized international bureaus, like the Universal Postal Union and the Union for the Protection of Industrial Property (patents, trade-marks, etc.). International conferences in connection with such subjects—of which as many as 100 have been held in a year—

have paved the way for the Covenant of the League of Nations, which, in addition to obtaining international coöperation for the prevention of war, is planned to take over the regulation of many of these world forces (see League of Nations). The league also provides for doing away with the evils of secret treaties by a provision requiring the registering with it of all treaties among its members.

On account of the magnitude and importance of the interests involved, treaties become valid only when they have been ratified, and states may refuse ratification if their agents exceed their authority. With few exceptions, the negotiation and the ratification of treaties in European states are in the same hands, and ratification follows as a matter of course. In the United States, in several cases treaties negotiated by the president and the state department have been rejected by the Senate.

Refusal to abide by a treaty is a cause of war, unless it has been abrogated by mutual consent or otherwise

annulled. If either party refuses to perform a single stipulation of the treaty, the other party is released from his obligations and the entire agreement ceases to be binding; or the injured party may insist upon compliance and demand indemnities for damages caused by the breach. Occasionally (as often in the case of commercial treaties) the period of the treaty's duration is stated in the treaty.

Many important treaties and conventions are framed by international bodies known as "congresses" or "conferences," such as the Congress of Vienna (1815) and the Congress of Berlin (1878). The determinations of such bodies are usually embodied in treaties, but at times are expressed in statements known as "declarations," such as the Declaration of Paris (1856) abolishing privateering and regulating blockade. "Concordat" is the name applied to an agreement between the pope and a secular power for the regulation of ecclesiastical affairs. (For list of Historical Treaties, see Treaties in Fact-Index.)

The KINDLY OLD GIANTS of the PLANT WORLD *How Trees Build, Defend, and Enrich the Land, and Furnish Fuel, Shelter, Food,* *and Tools to Men—The Garment of Perpetual Youth which Keeps* *the Oldest Living Things Forever Young*

TREES. Nothing in all the plant world is so rooted in the affection and the veneration of mankind as the tree. The friendly, fostering, kindly tree! Its beauty is a never-ending delight; its living branches afford shade and shelter; its fruit or its nuts furnish food; and its felled trunk gives us houses, furniture, tools, weapons, and fuel. A single species may supply nearly all the more important of the simple wants of primitive men. From one part or another of various trees civilized peoples obtain the most important of the fruits; nearly all nuts; coffee, chocolate, and cocoa; nutmeg, mace, cloves, allspice, and cinnamon; sago; maple sugar; olive oil, almond oil, and coconut oil; quinine; camphor; timber and timber products; cork, dyes, paper, and rubber, as well as turpentine and various gums, resins, balsams, and essences.

What is a tree? "A woody perennial plant," says the dictionary, "having a single main stem or trunk (as distinguished from a shrub, which may have many stems from a single main root), commonly exceeding ten feet in height, and usually bearing a head of branches and foliage or a crown of leaves at the summit." Although the dictionary admits "no exact line of demarcation" between shrubs and trees, we usually feel that "tree" is a rather precise and definite term.

The slender beech and the sapling oak
That grow by the shadowy rill,
You may cut down both at a single stroke;
You may cut down which you will.

But this you must know: that as long as they grow,
Whatever change may be,
You never can teach either oak or beech
To be aught but a greenwood tree.

Yet a tree is merely a plant which has attained greatness in girth, height, and span of years; there is no botanical class of trees as such. The pea is the little cousin of the locust tree, for both are pod-bearers; the strawberry is kin to the pear tree, for both belong to the great rose clan (see Plant Life). As among human families, so among plants, some display a more decided tendency than others toward great size and longevity.

Roughly and broadly, the two main classes of our familiar trees may be described as: (1) conifers, naked-seeded plants, typically cone-bearing, needle-leaved or scale-leaved, usually of tall and slender habit and usually retaining their leaves throughout the year; and (2) broad-leaved trees with cased seeds, usually lower and more spreading in habit than the conifers, infinitely various in fruit and flower, and usually deciduous, that is, shedding their leaves at the approach of winter.

The oldest and hugest living things on the globe are to be found among the trees. Some of the giant sequoias of California reach a height of 300 feet. One of them was entering on its third millenium when Charlemagne was crowned at Rome; it was more than a thousand years old at the birth of Christ; it was centuries old when the ancient city on the Tiber, according to legend, was founded. Yet neither their size nor their age is so wonderful as their perennial youth. In sober fact, and no mere poetic phrase, every tree is clothed and garlanded with youth—even, some have thought, with a kind of potential immortality. The *cambium*, or cylinder of cells around the tree between the bark and the wood, is perpetually

youthful tissue; the little cells at the tip of every twig have the same capacity of development as the cells in a just-sprouted seedling. The botanist De Candolle believed that trees do not die from old age but only from injury or disease.

How Trees Grow

Each year the tree increases in girth by adding a cylinder of vascular tissue or sap-conveying wood, built up by the cambium, just outside last year's wood and just inside the bark (*see Bark*). In temperate climates each year's ring usually remains so distinct that the age of the tree may be estimated by counting the rings.

By the varying thickness of the rings, these tree ring calendars also reveal the wet and dry years through which the tree has lived (*see Drought*). Cellulose is the substance which stiffens the tree trunk as lime does the animal skeleton, and enables it to withstand enormous strain (*see Cellulose*). Gradually the sap ceases to run in the old wood; the life of the tree goes on between the bark and the heart, and at the tips of the branches. Hence the heart may decay while the tree continues to flourish with little depreciation of its chances for long life except through its diminished mechanical resistance to the wind and increased lodgment to moisture. Tree surgery repairs such damages by cleaning out the cavity and applying a waterproof filling much as a dentist cleans and fills a decayed tooth (*see Tree Surgery*). Yet, if the tree is cut down, it is the heart-wood that makes the most durable lumber.

This applies to the two great classes of our familiar trees, conifers and deciduous trees. Palms have no heart-wood, sap-wood, cambium, or true bark. Their vascular tissue runs in little stringy bundles scattered throughout the pithy trunk, as in a cornstalk. These trees, therefore, do not increase in girth annually, keep no record of their ages, and grow only at the top.

Vital Services Performed by Trees

Even if we could dispense with lumber, firewood, paper, rubber, coffee, apples, peaches, dates, bananas,

and all other tree products, our welfare would be seriously threatened by the destruction of the trees of the world. Trees perform indispensable services to the land itself.

They rank with grasses as defenders of the soil against waves and floods (*see Floods*). Willows in cold and temperate regions and mangroves in the tropics are among the most efficient soil makers and soil binders. In wooded regions the temperature is more equable and the atmosphere moister than in treeless regions, other conditions being the same. The long roots of trees enable them to tap underground

water sources inaccessible to shallow vegetation, and the wide spread of foliage of the large tree gives out an enormous amount of moisture (*see Leaves*). The moisture evaporated from an average white oak on a single summer day has been estimated to be 150 gallons of water (*see Water*).

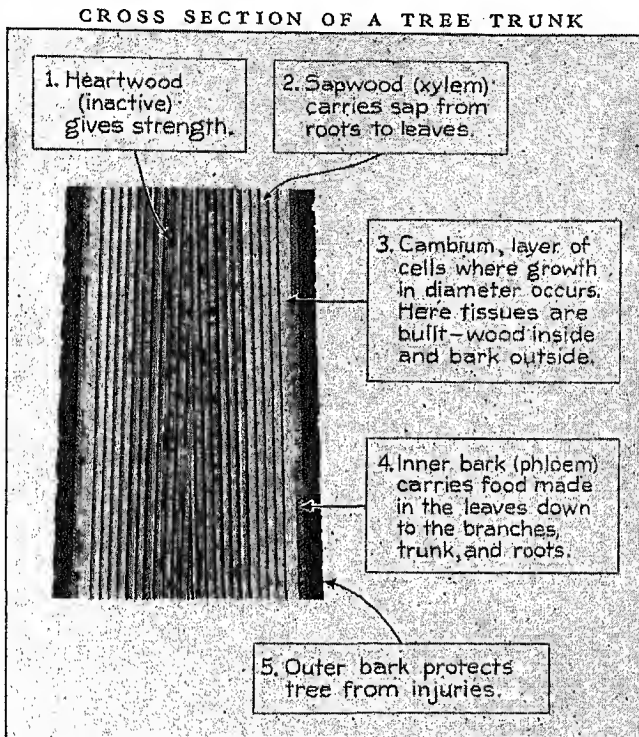
Again trees have an immense influence on the fertility of the soil—not merely that underlying the forest itself, but that of the whole watershed which drains it. The leaf-mold of centuries produces one of the richest of soils, which is also spongier and more absorbent and retentive of moisture than naked clay or matted prairie, from which water drains as

from shingles or felt. Thus the forests act as reservoirs of rain water, from which it drains slowly. Deforested regions, visited by infrequent torrential rains, are subject to destructive floods and drought (*see Drought*), and tend to become desert, as in famine-stricken China and to a slighter degree in deforested parts of the United States. The institution of forest reserves and of state and national forestry departments indicate an awakening appreciation of the invaluable service of trees (*see Forests*).

Exotic Trees of Strange Habit

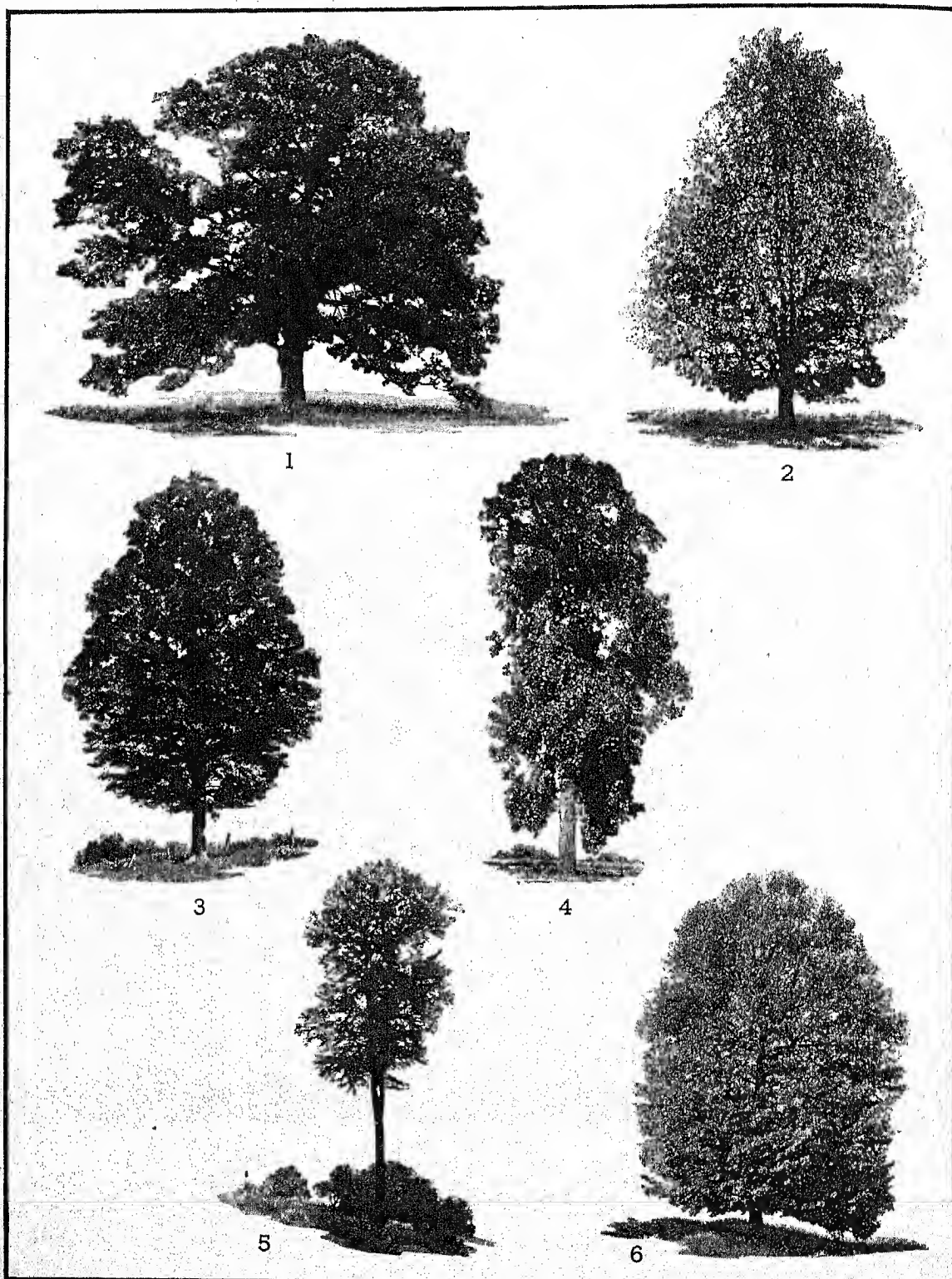
All trees are interesting; some are very strange. Among the strangest are the tropical mangrove and banyan, which send down from their extended branches roots that grow into supporting trunks, so that the tree in time becomes a grove (*see Banyan*). Then

Continued on page 136



This diagram shows the chief parts of tree trunk and tells what they do. Notice that the sap (water and minerals) moves up from the roots through the sapwood, and that the food manufactured by the leaves with the aid of sunlight (photosynthesis) travels down through the inner bark to nourish all parts of the tree including the roots.

IMPORTANT HARDWOOD TREES OF NORTH AMERICA—I



The trees on this page and the next are ranked as the most important by the hardwood lumber industry of the United States. How many can you recognize? 1. Red Oak (*Quercus rubra*), one of the largest of the oaks. 2. Red Gum or Sweet Gum (*Liquidambar styraciflua*). 3. Sugar Maple or Hard Maple (*Acer saccharum*). 4. Tulip Tree, Whitewood, or Yellow Poplar (*Liriodendron tulipifera*). 5. Yellow Birch or Gray Birch (*Betula lutea*). 6. Tupelo, Sour Gum, or Black Gum (*Nyssa sylvatica*).

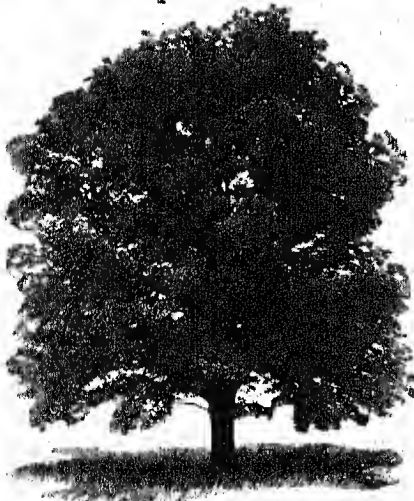
IMPORTANT HARDWOOD TREES OF NORTH AMERICA—II



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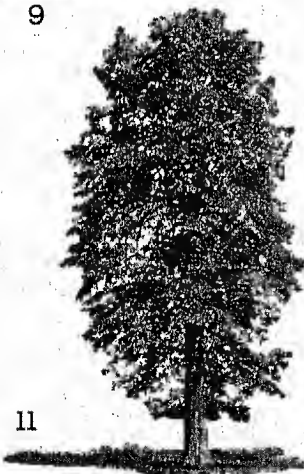
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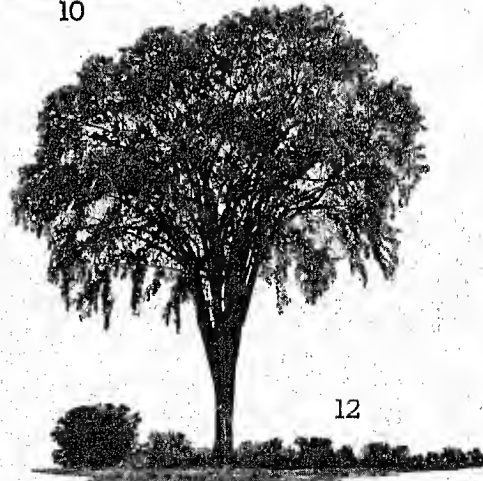
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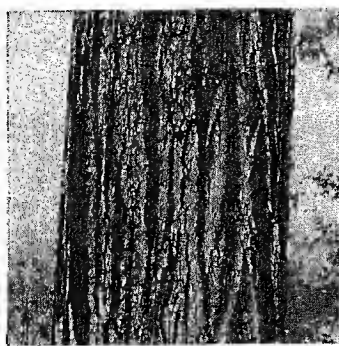
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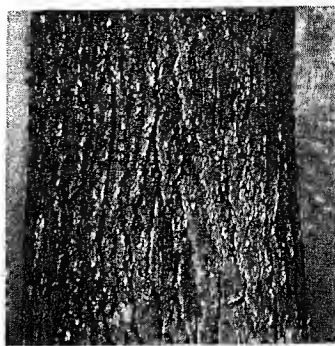
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7. Cottonwood or Carolina Poplar (*Populus deltoides*). 8. Chestnut (*Castanea dentata*). 9. White Ash (*Fraxinus americana*). 10. Beech (*Fagus americana*). 11. Basswood or American Linden (*Tilia americana*). 12. American Elm, White Elm, or Water Elm (*Ulmus americana*). These photographs are reproduced through the courtesy of the United States Forest Service and the American Forestry Association. The next two pages show how to distinguish these same trees by close-up views of bark and leaves.

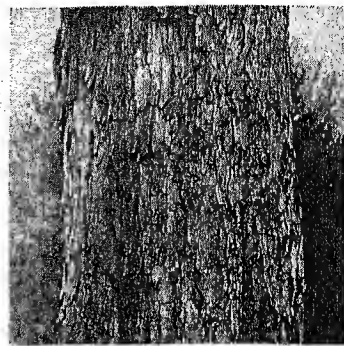
IMPORTANT HARDWOOD TREES OF NORTH AMERICA—III



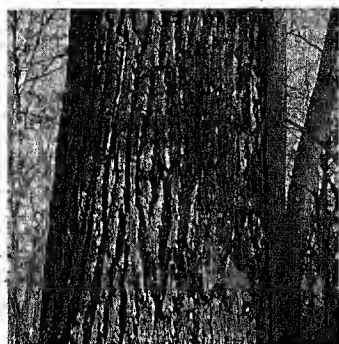
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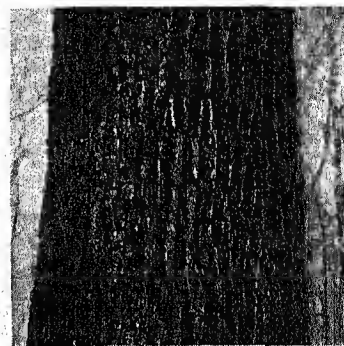
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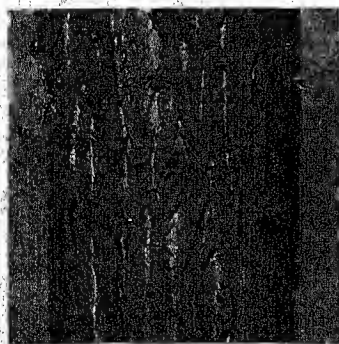
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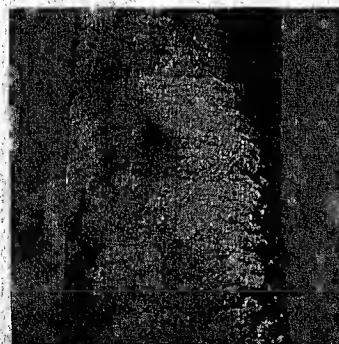
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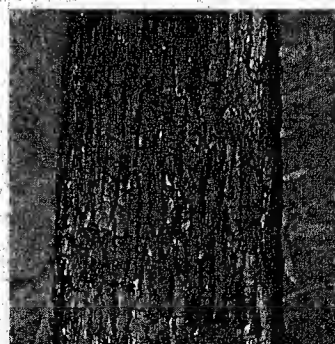
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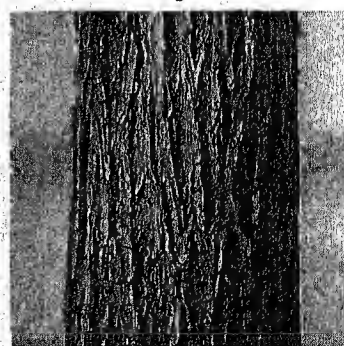
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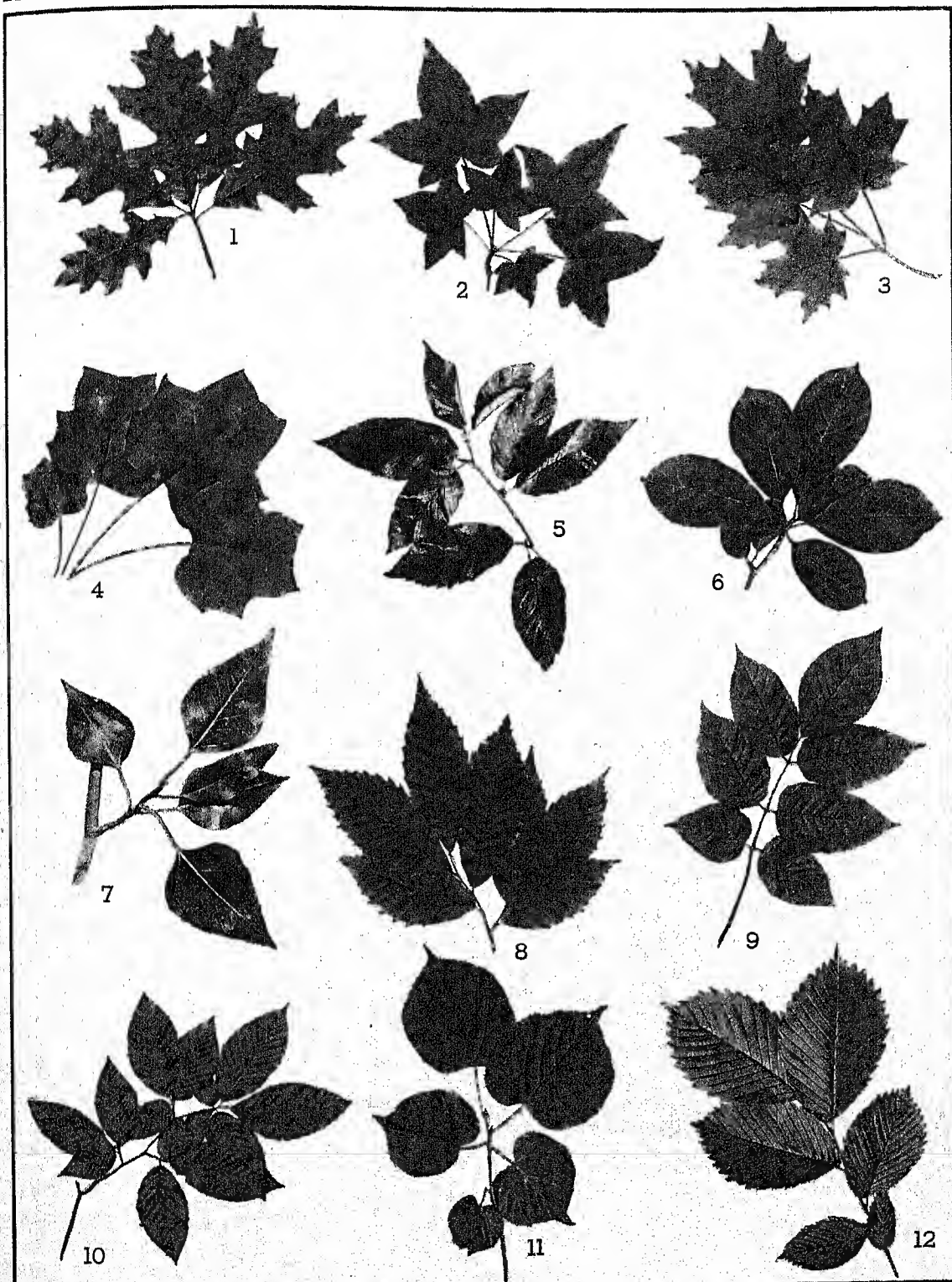
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12

The appearance of the bark is one of the best ways to distinguish hardwood trees in the winter time when the leaves are gone. The pictures here show the barks of the same trees that are illustrated in full view on the two preceding pages. 1. Red Oak. 2. Red Gum or Sweet Gum. 3. Sugar Maple or Hard Maple. 4. Tulip Tree or Yellow Poplar. 5. Yellow Birch. 6. Tupelo or Sour Gum. 7. Cottonwood. 8. Chestnut. 9. White Ash. 10. Beech. 11. Basswood or American Linden. 12. American Elm or White Elm.

IMPORTANT HARDWOOD TREES OF NORTH AMERICA—IV



Here are illustrated the leaves of the same group of trees shown on the preceding pages. In each case the photograph includes several leaves as they grow on the twig, for the arrangement on the twig is often an important help in identifying them. 1. Red Oak. 2. Red Gum or Sweet Gum. 3. Sugar Maple or Hard Maple. 4. Tulip Tree or Yellow Poplar. 5. Yellow Birch. 6. Tupelo or Sour Gum. 7. Cottonwood. 8. Chestnut. 9. White Ash. 10. Beech. 11. Basswood or American Linden. 12. American Elm or White Elm.

there is the baobab or monkey-bread tree, which grows immensely broad without growing proportionately tall, so that its trunk may measure 20 to 30 feet in diameter with a height of only 60 to 70 feet, while its branches, 50 to 60 feet long and each as thick as a good-sized tree, sweep the ground with their foliage. In South American forests are several different cow trees, which yield a creamy, pleasant-tasting juice, said to form an acceptable substitute for milk; these are generally related to the trees from which rubber is obtained. The "deadly upas tree," whose poisonous breath was once believed to be fatal to every living creature within ten miles, has been proved a traveler's fable; the real upas, however, has a poisonous juice.

Where No Trees Grow

There are on the solid portions of the earth three situations in which it is vain to look for trees: near the poles, on mountain tops above the timber line (which of course varies in height according to the latitude), and on the arid desert. Willow and birch, stunted to shrubs, grow farther north than any other woody plants. The North Pole regions south from about latitude 70° are girdled with conifers, which usually form also the highest forest belt in the mountains of the northern latitudes, and extend even into the temperate lowlands. From the north temperate zone southward is the kingdom of the broad-leaved trees. Breadth of leaf or density of finer leaf growth becomes more and more characteristic of tree foliage as we go from the latitudes where

oak and ash, elm and willow flourish into those where palm, rubber tree, and banana grow. Certain families of the conifer tribe, in particular the curious *Araucaria* group, some members of which have comparatively broad leaves, occur in the tropics and are found here and there in the Southern Hemisphere, but they nowhere dominate as northern conifers do in the far north. The tough stunted Antarctic beech is the chief forest growth to defy the gales that batter forever at the chill coasts of the extreme tip of South America.

Distribution of Trees

The present distribution of trees, interpreted in the light of the geological record, forms the latest

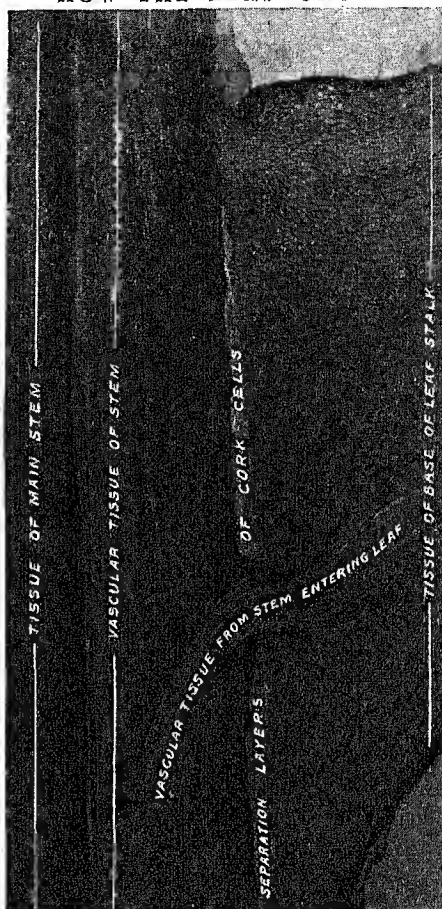
chapter in many a strange story. The North American tulip tree and sassafras were believed to be the sole living representatives of their respective genera until the recent discovery of Chinese species of each genus. What means the occurrence of sister species isolated on opposite sides of the globe? Immense cosmic changes have swept the kinsfolk of our sassafras and tulip tree out of existence, leaving only a single species of each at the eastern and western ends of the earth.

Tulip tree, sassafras, and all their cousins in the vast connection of broad-leaved trees, however, are mere pushing upstarts compared with the real first families among trees, the conifers and the other naked-seeded groups. The giant sequoias and redwoods of the Pacific coast are the sole survivors of an ancient and once widely distributed group of conifers; the scattered *Araucarias* of the Southern Hemisphere are the feeble remnants of another formerly powerful clan. The cycads and that "living fossil," the ginkgo or maidenhair tree (see Ginkgo) have a lineage that goes back to the Coal Age—for when we burn coal we are burning wood and vegetable debris of a far distant past when the prevailing forest tree combined more or less many of the characteristics found in the modern fern, cycad, and conifer (see Conifer).

Some Historic Trees

Because trees live so much longer than human beings, many trees have become historic monuments. Such was the sacred bo tree in India under which, according to tradition, Buddha received enlightenment (the original tree has vanished, but a bo tree in Ceylon, said to be over 2,000 years old, is venerated by Buddhists as sprung from a slip of the sacred tree); such were the King's Oak at Woodstock, England, the hunting lodge of Henry II; the Royal Oak which sheltered Charles II after his defeat at Worcester; the Charter Oak at Hartford, Conn. (blown down in 1856), which was said to have been the depository for the Connecticut charter demanded in surrender by Andros in 1687; and the Washington Elm at Cambridge, Mass., under which Washington in 1776 assumed command of the Continental Army. Some trees are much longer lived than others. Besides sequoias, redwoods, and oaks, the trees which

HOW THE LEAF GROWS



This is the lengthwise section of the base of a horse chestnut leafstalk, showing how the vascular tissue of the stem, carrying moisture and nutriment, branches off into the leafstalk, piercing the corky layer which wraps the stem.

attain remarkably long life include banyans, cypresses, junipers, yews, olives, elms, and walnuts.

Classification of Trees

Among the lower or non-seed-bearing orders of plants, the tropical tree-fern is the only one to reach tree estate. Both of the two great divisions of seed-bearing plants, the gymnosperms or naked-seeded plants, and the angiosperms, or plants which hide their seeds in various fruits or seed-cases, include numerous kinds of trees.

The gymnosperms include the conifers; the small group of the tropical cycads, which most of us probably take for tree-ferns or palms when we see them in greenhouses; and the still smaller and stranger group of the ginkgoales, represented among living plants only by the Chinese ginkgo.

Of the two main divisions of the angiosperms, that in which the seed has a single lobe, as in corn and wheat (the monocotyledons), is represented among the trees only by the palms—unless we reckon that giant grass, bamboo, as a tree. The monocotyledonous lily tribe, too, has some treelike members—branched yuccas which grow 40 feet or so tall. All the other trees belong to the division with two-lobed seeds (dicotyledons). As bamboos, palms, giant yuccas, and tree-ferns are all tropical or subtropical denizens, it will be seen that all the trees of temperate and cold regions, as well as many tropical trees, are either naked-seeded plants (gymnosperms, of which practically all are conifers outside of the tropics), or plants with encased two-lobed seeds (dicotyledonous angiosperms).

Among the latter or "dicotyledon" class of plants, the most important tree group, including many of the best nut and timber trees, is found among apetalous plants, whose inconspicuous flowers lack the corolla and sometimes the calyx. They include walnuts, butternuts, and hickories, willows, poplars and cottonwoods, birches, alders, beeches, chestnuts, oaks, elms, mulberries, and the Osage orange. The polypetalous group of trees, having both calyx and a many-petaled corolla, is more conspicuous for beauty of flowers and for the number of fruit trees it contains than for its contribution to timber supplies, although several genera, particularly the maples and the lindens or basswoods, are valuable timber trees. It includes the great rose family in which are found the most valuable of our fruits—apples, pears, peaches, quinces, plums, and cherries, and also almonds, as well as such trees as mountain ashes and hawthorns. The polypetalous group also includes the magnificent magnolias, the tulip-tree, papaws, buckeyes, the horse-chestnut, dogwoods, the sassafras, bays, witch-hazels, sweet gums, plano-trees, hollies, tupelos, prickly ashes, and the pea family, in which the most important trees are the locusts. The highest group in the scale of development, that with flowers in which the petals are more or less fused into a tube (gamopetalous), contains comparatively few trees, particularly in temperate regions. Probably the most important of its groups economically is the olive family. Persimmons, catalpas, and sourwoods belong to other gamopetalous families.

The principal native trees of the United States include, among the conifers, something like 40 species of pines, larches or tamaracks, spruces, hemlocks, firs, arbor-vitae, cedars, and junipers. Of monocotyledonous angiosperms the chief tree is the Florida palmetto; a few other palm species occur, mostly confined to the Florida keys. The branched yucca grows in the Southwest. The dicotyledons

include the vast majority of American trees. Hickories are an exclusively North American genus, and 11 out of the 12 species, including the pecan, are found in the United States, the Mexican hickory being the exception. The sequoias, including the "big trees" and redwoods, now confined to the United States, were formerly widespread.

TREE SURGERY. Trees are living things, subject, like all living things, to disease, decay, and death. When a tree is wounded from any cause, fungus spores lodge in the wound, germinate, and send forth creeping threads which attack the cell tissues. Other rot-producing organisms enter. In time a tree is so weakened that it dies unless a tree surgeon saves it.

Until the time of John Davey in 1880, tree surgery was an almost unknown science. Now in any park or city street you may find old trees still flourishing because they were treated by a tree doctor.

If a tree trunk has developed an area of decay, the process of artificial repair is in some respects like dental work. First the rotted wood must be excavated and the cavity cleaned, sterilized with creosote, and waterproofed with tar or asphalt. Shaping the cavity requires expert knowledge. The edges of the bark and sap-wood must also be shel-lacked to prevent infection and drying out. Shallow cavities are usually left unfilled; weak cavities are mechanically braced; under certain conditions cavities are filled with asphalt, or wood, or cement mixtures installed in sections to allow for the natural swaying of the tree. When the work has been properly done, the bark gradually grows inward in course of time and heals the wound.

Injured branches, resulting from improper pruning or other causes, are treated in a similar way. Limbs should be removed close to the trunk or parent branch so as not to leave a projecting stub. When sawing off a large branch, it should first be undercut to prevent stripping the bark as the limb falls. In all cases it is important to sterilize, shellac, and waterproof the scars. Tree surgery includes other special operations, such as the bracing of weak trees, the guying of limbs to check splitting at the crotch, the removal of girdling roots, and other care that will contribute to the health of the tree.

TRENT, ITALY. In the center of the territory which the Italians used to call *Italia Irredenta* (unredeemed Italy) lies the city of Trent, or Trento. From 1803, with only one break during the Napoleonic era, the inhabitants of this mountain region were under the yoke of Austria until the final treaty of peace after the World War of 1914-1918 made the entire Trentino district a part of Italy.

Trent is situated on the Adige River, midway between the Swiss border and the Gulf of Venice. Its strategic importance is due to the fact that it commands the Brenner Pass, between Italy and Germany.

From 1545 to 1563 Trent was the scene of the famous Council of Trent, called together to define the doctrines of the Roman Catholic church on points raised by the Reformation, and to effect reforms within the church. Population, about 60,000.

'TRENT' AFFAIR. During the Civil War relations between England and the United States frequently became so strained that war threatened. The slackness of the British authorities in permitting the *Alabama* cruiser to be built in Great Britain and escape to prey on Northern commerce angered the Federal government (see 'Alabama' Claims). Almost equally offensive to Great Britain was the conduct of the United States in what is called the *Trent* affair.

In 1861 the Confederacy appointed James M. Mason and John Slidell as commissioners to Great Britain and France. They reached Havana, Cuba, on a swift blockade runner, and there embarked on the British steamer *Trent*, bound for Europe. In mid-ocean the *Trent* was overtaken by the United States steamer *San Jacinto*, and the two commissioners were made prisoners by Capt. Charles Wilkes. Mason and Slidell were confined in Fort Warren, Boston Harbor, for three months, when they were released in response to repeated British protests that their capture was contrary to international law.

The cool heads of President Lincoln and Secretary Seward and the wise counsel of Prince Albert, husband of Queen Victoria, averted the danger of war between America and England over this affair.

TRENTON, N. J. The capital of New Jersey is at the head of navigation on the Delaware River, 34 miles from Philadelphia and 56 miles from New York City. Many remains of the old colonial settlement tell of its rich historical background. The city's slogan "Trenton Makes—The World Takes" emphasizes its position as a thriving manufacturing center.

In 1679 an English Quaker, Mahlon Stacy, built a mill at the rapids on the Delaware. The Falls, as it was then known, soon became a depot for merchandise moving between the great markets of Philadelphia and New York. The near-by Pennsylvania coal fields later provided cheap fuel for the rapidly growing industries. Transportation facilities kept pace with the development of the region. In 1932 the Delaware River channel was deepened to 20 feet, making Trenton a port for sea-going vessels. The old Delaware and Raritan Canal, opened in 1834, between Trenton and New York Bay, is to be deepened as a link in the intracoastal waterway system (see Canals).

The pottery industry, which began in colonial times, received new life about 1850 when craftsmen from England and Ireland were brought in. One of these, Walter Lenox, founded the plant which still bears his name. Every type of pottery, from the fine Lenox and Belleek wares to porcelain electrical supplies and sanitary earthenware, is manufactured in the "Staffordshire of America."

Trenton is one of the world's largest producers of steel wire and cable. The industry dates from 1848 when John A. Roebling moved his mill to this city. The Roebling firm built the Brooklyn Bridge and the old suspension bridge over Niagara Falls. Other important products are rubber goods, linoleum, textiles and wearing apparel, parachutes, and cigars.

Along the shore of the Delaware River, Mahlon Stacy Park makes a grassy, tree-lined background for the State Capitol and other public buildings. The Capitol is a rambling confusion of varying architectural styles built over a period of a hundred years. The State Capitol Annex houses various state departments and courts, the State Library and the State Museum. Facing the Capitol grounds are the Old Barracks, erected in 1758 to house troops during the French and Indian War. The Georgian Colonial Building, of fieldstone with white wood trim, was restored in 1914-21 and is now a museum. Near it are the Masonic Lodge House (1793); the Douglass House, where Washington and his officers met in 1777 to plan the retreat to Princeton; and the modern Soldiers' and Sailors' War Memorial Building.

The oldest building in the city is Bloomsbury Court, built about 1719 by William Trent, later chief justice of the colony. Trent bought Mahlon Stacy's land from his son in 1714 and renamed the settlement Trent's Town, later Trenton. A monument bearing a statue of Washington marks the spot where, after the famous crossing of the Delaware, Washington surprised the Hessians and took almost a thousand prisoners (Dec. 26, 1776). Other points of interest are the Old Friends Meeting House (1739); Bow Hill, once the home of Joseph Bonaparte; and, eight miles up the river, Washington Crossing State Park.

Trenton is the seat of a state teachers college and of a school of industrial arts, supported by both the city and the state. It became the capital of the state in 1790. The commission form of government was adopted in 1911. Population (1940 census), 124,697.

TRIESTE (*trè-èst'*), ITALY. This ancient port stands at the head of the Adriatic, wedged between the mountains and the sea. Once Austria's only important seaport, it was given to Italy as part of *Italia Irredenta* (unredeemed Italy) in 1919.

The old city clusters about the castle high above the harbor, and flows in twisting, stairlike streets down the steep slopes of the hills. The new city, much of it on reclaimed land, lies on the shore bordering the crescent-shaped harbor. This is a region of sunny squares, green gardens, palaces, theaters, and broad straight avenues. The Via del Corso is the industrial and commercial artery of the city.

Trieste carries on a large trade with the Orient and the Near East. It has extensive shipyards, petroleum refineries, silk and cotton mills, chemical plants, iron and steel mills, and fish canneries.

The Roman city of Tergeste was founded by the Emperor Augustus about 30 B.C. The Cathedral of San Guisto, part of which dates from the 6th century, is believed to occupy the site of a Roman temple. In 1382, after centuries of warfare with its rival, Venice, Trieste passed into the hands of Austria. Three-fourths of the people are Italians. The rest are a cosmopolitan mingling of Slavs, Germans, Greeks, Armenians, Albanians, and Turks. Population, about 255,000.

The USEFUL Science of TRIANGULAR MEASUREMENT

TRIGONOMETRY. If you make a four-sided frame out of sticks fastened with a single nail at each corner, you can easily force the frame out of shape. The angles of the corners can be changed without changing the lengths of the sides. But if you fasten three sticks together in the same way, you will find that you cannot change the shape of your frame without breaking the sticks or tearing out the nails.

This is because you have made a triangle, and a triangle is by nature a rigid shape. It cannot be changed without changing the lengths of its sides, as well as its angles. Geometry expresses this fact when it says that a triangle is *determined* by the measurements of its three sides, or by the measurements of two of its angles and one of its sides. From the known measurements, the others can be computed. This property of triangles makes them extremely useful *tools* in mathematics, science, and engineering.

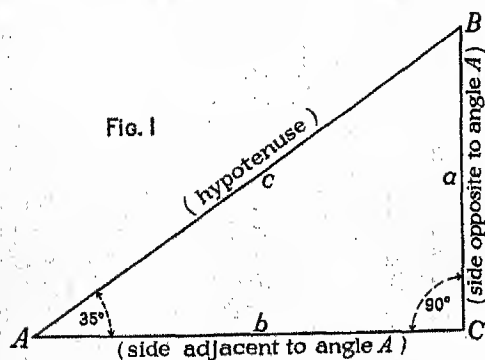
Making Hard Problems Easy

The branch of mathematics that deals with the relations between the angles and the sides of triangles is called *trigonometry* (from the Greek words meaning "triangular" and "measurement"). Some of its elements were known to the pyramid builders of Egypt, but it did not take exact form until the Greek astronomer Hipparchus worked with it in the 2d century B.C.

Trigonometry is founded upon geometry, makes use of algebra, and introduces some principles of its own. The most important of these are the rules based on the simple characteristics of right triangles (right-angled triangles). A knowledge of these rules makes it easy to solve thousands of problems that would otherwise baffle us.

Rules Explained by a Diagram

Fig. 1 is a right triangle. For convenience it is lettered so that side a is opposite angle A , side b opposite angle B , and side c opposite angle C .



Before we examine this triangle from the point of view of trigonometry, we must recall one important fact of geometry, namely, that the sum of the angles of a triangle equals 180° , or two right angles. In a right triangle, therefore, the sum of the two acute angles (A and B) is 90° , and the two angles are said to be *complementary* to each other. Therefore, what

we say here about angle A in Fig. 1 applies with suitable modifications to angle B .

Now it is evident that if angle A were larger or smaller, all the relations between the sides of our triangle would be changed. If it were larger, side a , for instance, would be longer in proportion to side b . Trigonometry shows us exactly how the size of angle A is related to all the sides of our triangle. It tells us, for example, that, if angle A is 35° , then the length of side a and the length of side c will be such that $\frac{a}{c} = .574$; and the length of b will be such that $\frac{b}{c} = .819$. These ratios will apply to any right triangle, *regardless of size*, in which angle A is 35° .

The discovery that such ratios exist and the computation of them for angles of all sizes was an achievement of higher mathematics. It is not necessary, however, to understand how these ratios were found in order to appreciate their importance. With nothing but geometry to work with, we have to know the length of two sides of a right triangle before we can find the length of the third side. But with ratios like the above at our command, we need only know the length of one side and one of the acute angles in order to find all of the other elements of the triangle.

In Fig. 1, for example, if side c is 10 feet long and angle A is 35° , then we find side a from the fact, given above, that $\frac{a}{c} = .574$. Substituting 10 as the value

of c , we have $\frac{a}{10} = .574$. Therefore $a = 5.74$ feet.

Similarly, if $\frac{b}{c} = .819$, then $b = 8.19$ feet.

The Six Functions of an Angle

There are six possible ratios between the sides of our triangle, namely, $\frac{a}{c}$, $\frac{b}{c}$, $\frac{a}{b}$, $\frac{b}{a}$, $\frac{c}{a}$, and $\frac{c}{b}$. These are called *trigonometric functions*, and, when we relate them to angle A , they are called the functions of A . Each of these functions has a name, as follows:

The *sine* of angle A is the ratio $\frac{a}{c}$ (the side *opposite* the angle divided by the *hypotenuse* of the triangle).

The *cosine* is the ratio $\frac{b}{c}$ (the *adjacent* side divided by the *hypotenuse*).

The *tangent* is the ratio $\frac{a}{b}$ (the *opposite* side divided by the *adjacent* side).

The *cotangent* is the ratio $\frac{b}{a}$ (the *adjacent* side divided by the *opposite* side).

The *secant* is the ratio $\frac{c}{b}$ (the *hypotenuse* divided by the *adjacent* side).

The *cosecant* is the ratio $\frac{c}{a}$ (the *hypotenuse* divided by the *opposite* side).

In formulas and problems the names of these six functions are abbreviated without periods as follows: *sin*, *cos*, *tan*, *cot*, *sec*, and *csc*. Thus $\sin A$ means the sine of the angle A .

It is evident that the functions of angle A apply also to angle B in such a way that $\sin A$ equals $\cos B$, $\cos A$ equals

$\sin B$, and so on. In general we say that a function of an angle is the *cofunction* of its complementary angle.

Any angle between 0° and 90° may be part of a right triangle, and as such has its own specific functions. The accompanying table gives the functions of whole-degree angles to three decimal places.

TRIGONOMETRIC FUNCTIONS

Angle	sin	cos	tan	cot	sec	csc	
0°	0.000	1.000	0.000	∞	1.000	∞	90°
1°	.018	1.000	.018	57.290	1.000	57.296	89°
2°	.035	.999	.035	28.636	1.001	28.648	88°
3°	.052	.999	.052	19.081	1.001	19.105	87°
4°	.070	.998	.070	14.301	1.002	14.337	86°
5°	.087	.996	.088	11.430	1.004	11.469	85°
6°	.105	.995	.105	9.514	1.006	9.567	84°
7°	.122	.993	.123	8.144	1.008	8.206	83°
8°	.139	.990	.141	7.115	1.010	7.185	82°
9°	.156	.988	.158	6.314	1.013	6.392	81°
10°	.174	.985	.176	5.671	1.015	5.759	80°
11°	.191	.982	.194	5.145	1.019	5.241	79°
12°	.208	.978	.213	4.705	1.022	4.810	78°
13°	.225	.974	.231	4.332	1.026	4.445	77°
14°	.242	.970	.249	4.011	1.031	4.134	76°
15°	.259	.966	.268	3.732	1.035	3.864	75°
16°	.276	.961	.287	3.487	1.040	3.628	74°
17°	.292	.956	.306	3.271	1.046	3.420	73°
18°	.309	.951	.325	3.078	1.052	3.236	72°
19°	.326	.946	.344	2.904	1.058	3.072	71°
20°	.342	.940	.364	2.748	1.064	2.924	70°
21°	.358	.934	.384	2.605	1.071	2.790	69°
22°	.375	.927	.404	2.475	1.079	2.669	68°
23°	.391	.921	.425	2.356	1.086	2.559	67°
24°	.407	.914	.445	2.246	1.095	2.459	66°
25°	.423	.906	.466	2.145	1.103	2.366	65°
26°	.438	.899	.488	2.050	1.113	2.281	64°
27°	.454	.891	.510	1.963	1.122	2.203	63°
28°	.470	.883	.532	1.881	1.133	2.130	62°
29°	.485	.875	.554	1.804	1.143	2.063	61°
30°	.500	.866	.577	1.732	1.155	2.000	60°
31°	.515	.857	.601	1.664	1.167	1.942	59°
32°	.530	.848	.625	1.600	1.179	1.887	58°
33°	.545	.839	.649	1.540	1.192	1.836	57°
34°	.559	.829	.675	1.483	1.206	1.788	56°
35°	.574	.819	.700	1.428	1.221	1.743	55°
36°	.588	.809	.727	1.376	1.236	1.701	54°
37°	.602	.799	.754	1.327	1.252	1.662	53°
38°	.616	.788	.781	1.280	1.269	1.624	52°
39°	.629	.777	.810	1.235	1.287	1.589	51°
40°	.643	.766	.839	1.192	1.305	1.556	50°
41°	.656	.755	.869	1.150	1.325	1.524	49°
42°	.669	.743	.900	1.111	1.346	1.495	48°
43°	.682	.731	.933	1.072	1.367	1.466	47°
44°	.695	.719	.966	1.036	1.390	1.440	46°
45°	.707	.707	1.000	1.000	1.414	1.414	45°
	cos	sin	cot	tan	csc	sec	Angle

Notice that the angles from 0° to 45° read *downward* in the column at the extreme left, those from 45° to 90° read *upward* at the extreme right. In looking up the functions of angles of 45° or less, use the guide line at the top; for the functions of angles of more than 45° , use the guide line at the bottom.

Solving a Practical Problem

The application of trigonometric functions to a practical problem is illustrated by Fig. 2. We want to find the height of the cliff, but we cannot measure

our distance from the cliff's base. So from point A we measure the angle between a horizontal line of sight and the line of sight to the top of the cliff. We find it to be 40° . Then we step back exactly 25 feet to point A' and find the corresponding angle has changed to 30° . This is all the information we need for our solution.

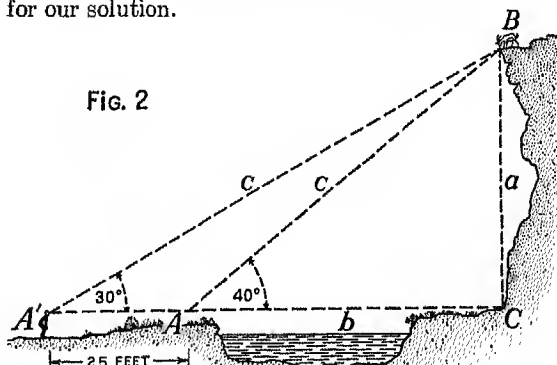


Fig. 2

The information we have involves the *opposite* sides and the *adjacent* sides of the angles we have measured. Therefore we can use either the tangent ratio or the cotangent ratio. The latter will make the figuring somewhat simpler. So we find in the table that $\cot 40^\circ$ is 1.192 and $\cot 30^\circ$ is 1.732. Then we figure as follows:

$$\begin{array}{ll}
 \text{In triangle } ABC & \text{In triangle } A'BC \\
 \frac{b}{a} = 1.192 & \frac{b+25}{a} = 1.732 \\
 b = 1.192a & b = 1.732a - 25 \\
 \therefore 1.732a - 25 = 1.192a & \\
 1.732a - 1.192a = 25 & \\
 .540a = 25 & \\
 a = 46.2 &
 \end{array}$$

Notice that it was not necessary to find out the actual distance to the cliff. It was enough to know how a change of 25 feet in that distance changed the angles of our triangles. Of course, the distance to the cliff could have been calculated from the same data merely by solving the cotangent ratios for b instead of for a . And the side c could be determined by applying the cosine ratios to our data.

Solving Oblique Triangles

Triangles which contain no right angle are called *oblique triangles*. They can always be divided into two right triangles by dropping a perpendicular from the largest angle to the opposite side. Then, by solving the two right triangles, the desired elements can be found. There are available also a number of short-cuts derived from the relation of oblique triangles to right triangles. One of these is the *law of sines*. It tells us that "in any triangle, the sides are proportional to the sines of the opposite angles." This means that

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

By using together any two of these expressions, we have a formula involving four elements of a triangle; and if three are known, the fourth can be found.

Upon the foundations described and illustrated here, trigonometry has developed a large number of additional principles, formulas, and operations. The field we have investigated is often called *plane trigonometry* because it applies to triangles with straight sides on flat surfaces. But there is also the field of *spherical trigonometry* which deals with triangles on the surfaces of spheres. Although the same functions are used—sines, cosines, etc.—the calculations are more complicated.

The sides of spherical triangles are usually considered as *arcs* connected by straight lines or radii to the center of the sphere. Their lengths may be expressed in degrees (as is done for lines of longitude on maps) or they may be expressed in *radians*. The radian is an angular measure consisting of an arc of the same length as the radius of the sphere or circle on which the arc lies.

Uses of Spherical Trigonometry

Spherical trigonometry is chiefly used in the calculations of astronomy and mathematical geography. Star maps have been constructed by this tool. The paths and speeds of planets have been accurately plotted, including the path and speed of the earth, both in its revolution around the sun and its rotation on its axis. If three positions of a comet are observed, then its path both behind and ahead may be determined. Predictions of eclipses to the exact moment, the instant that seasons begin, the times of moonrise and moonset, sunrise and sunset are but a few of the important facts computed by spherical trigonometry.

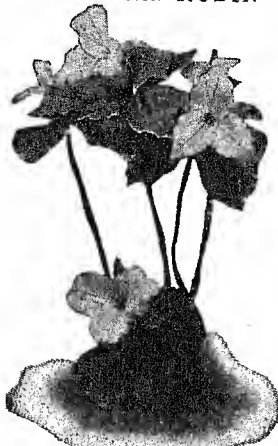
Earth maps which represent distances so great that the earth's curvature must be considered are plotted by the use of spherical triangles. Star maps and earth maps are used together by navigators, who employ instruments to measure the angles of a star or of the sun above the horizon. Then, from tables in the 'Nautical Almanac', the mariner determines his position. He makes other calculations to determine the direction he must steer his ship to reach a port by the shortest route (see Navigation).

The most expert navigators in all the world now guide the *Clipper* planes that cross the seas, and find, unerringly, small islands—such as the Hawaiian Islands and the Azores—that are mere dots in the great expanse of ocean. The large stratosphere planes that fly coast to coast above the clouds also use the stars—and trigonometry—for guidance. Bombers in war find their distant targets and return to their bases through the mathematical skill of their navigators.

Since many of the calculations of trigonometry are simplified by the use of *logarithms* (see Logarithms in FACT-INDEX), many texts of trigonometry include a chapter giving principles and practise in their use. (See also Geometry; Surveying.)

TRILLIUM. These white blossoms are popularly known as the "wake-robin"; a pretty legend tells us that, because they are among the first of spring, they are the flowers chosen by Mother Nature to wake the

THE "WAKE-ROBIN"



The trillium gets its nickname from the legend that these early spring flowers awaken the robin's song.

robins into song. The name trillium (from the Latin word *tres*, meaning "three") arises from their three flaring pointed petals, alternating with an equal number of green sepals. The plant belongs to the lily family, and there are several species. These include the early or dwarf trillium, which often thrusts its white flowers through the melting snows; the large white trillium, which is scentless; the nodding trillium whose flowers are white or pinkish white and delicately scented; the painted trillium, which has waxy-white petals striped with pink; and the red or purple trillium, whose flowers have a disagreeable musty odor. The trilliums are found from Canada to Florida, throughout the Middle West, and along the Pacific coast. They grow in the cool shade of damp, rich woods, and blossom

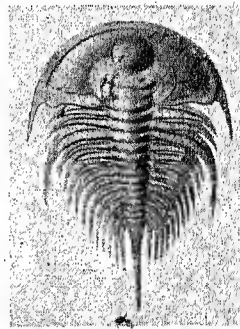
in April, May, or June. Scientific name of the common or nodding trillium, *Trillium cernuum*.

TRILOBITE. Ages ago, trilobites outnumbered all other forms of animal life. They were crablike creatures from the size of a small beetle to the size of a lobster, and they lived at the bottom of the sea. All of them died off long ago, but their remains are among the commonest fossils found in ancient rocks of the palaeozoic era in all parts of the world (see Geology).

The body of a trilobite was covered with a hard armor of shell, and like many crustaceans of later times it had to shed its shell as it grew and form a new one. Many of the trilobite fossils consist of cast-off shells.

The nearest living relatives of the trilobites are the so-called horse-shoe crabs, which are not crabs at all but primitive sea creatures that belong to the same class of Arthropods as the spiders and scorpions. (See picture of horse-shoe crab, page C-389.)

TRINIDAD. This island, six miles off the coast of Venezuela at the mouth of the Orinoco River, is only 1,862 square miles in area—not as large as Delaware. Yet it is the world's greatest source of natural asphalt and one of the largest producers of petroleum within the British Empire. Its asphalt comes from the famous "pitch lake," which is constantly renewed from underground sources (see Asphalt). Its petroleum, which is refined locally, has been exploited intensively only since about 1928.



Ancient trilobite

With Tobago, an island about 25 miles northeast, Trinidad is a British crown colony. The surface is varied, with rolling plains, high wooded hills, and occasional mountains (Tucuche Peak, 3,100 feet, is the highest). Three peaks gave it its name, Spanish for "trinity." Besides petroleum and asphalt, it exports sugar, cacao, copra, grapefruit, and limes.

One-third of the inhabitants are coolies from the East Indies. The rest are of mixed European and African blood, with a small white population of English, French, and Spanish origin. English is the official language and is spoken in the towns and in several of the country districts, but a French patois is heard in the cacao-growing regions of the north, and elsewhere Spanish is still used.

The climate of Trinidad is typical of the West Indies regions except that the wet and dry seasons are regular and that there are no hurricanes. The capital of the colony is Port of Spain, which has a population of about 90,000 and is one of the finest towns of the West Indies.

Trinidad was discovered by Columbus in 1498. It remained a Spanish possession until 1797, when it capitulated to a British force; it was ceded to Great Britain by the Treaty of Amiens in 1802. Sites for a naval base on the northwest tip of the island and for army airfields in the interior were leased to the United States in 1940. These form an important link in the defenses of the Panama Canal. Population, about 450,000. (See also West Indies.)



'A Reading from Homer', the Famous Painting by Alma-Tadema

TROJAN WAR. It was through a quarrel among the three great goddesses, so Greek legend tells us, that the war arose which resulted in the destruction of the mighty city of Troy—the war which inspired the immortal epics of the Greek Homer and the Roman Vergil, "a war so great that the sound of it has come ringing down the centuries from singer to singer and will never die."

The gods and goddesses were feasting together to celebrate the marriage of Peleus and Thetis, when Eris, the goddess of discord, who alone of the immortals had not been invited, came unbidden and threw among the guests a golden apple, on which was inscribed, "For the fairest." It was claimed by Hera (Juno), the wife of Zeus and the queen of heaven; by Athena (Minerva), the goddess of wisdom; and by Aphrodite (Venus), the goddess of love. As the strife became bitter, Paris, the son of King Priam of Troy, was called upon to award the prize of beauty. Hera promised him power and riches if he would

decide in her favor, and Athena offered him glory and renown in war. But when Aphrodite came forward and whispered to him that if she were awarded the prize, she would give him the love of the most beautiful woman in the world, Paris gave her the golden apple. From that time forth Hera and Athena were the enemies of Paris and of the city of Troy.

Now the fairest of all earthly women was Helen, who was already the wife of King Menelaus of Sparta, in Greece. Under the protection of Aphrodite, Paris sailed to Greece and while being entertained in the palace of Menelaus won the love of Helen and carried her away with him across the sea to his home on the Hellespont. Menelaus called upon all the kings and princes of Greece to help him avenge this great wrong. Among those who joined the expedition were the swift-footed Achilles, who was to win the greatest renown for strength and bravery; the mighty Ajax, the gallant Diomedes, the crafty Odysseus (Ulysses), and the aged Nestor, who was no longer

able to engage in battle, but to whom all the Greeks looked up for counsel. Agamemnon, king of Mycenae and brother of Menelaus, was chosen commander-in-chief of the Greek forces.

After two years' preparation the Greek fleet of more than 1,000 ships and an army of about 100,000 men—according to the story—assembled in the port of Aulis in northeastern Greece. But here they were detained by a calm. Seeking the reason for the delay they were told by a soothsayer that Agamemnon had killed a stag sacred to Artemis (Diana) and that the wrath of the goddess could be appeased only by the sacrifice of the offender's daughter. Agamemnon was forced to give his consent and his daughter Iphigenia was led to the altar. At the moment of sacrifice, however, Artemis, relenting, snatched the maiden away, leaving a hind in her place and carrying her away to be a priestess in her temple at Tauris.

The wind now proving favorable, the fleet set sail for Troy. The Trojans were well prepared for the conflict. King Priam, though too old to take an active part in battle, had gathered immense supplies of provisions and formed alliances with the neighboring princes and chieftains. The city was protected by mighty walls, and the Greek warriors were matched by such men as Hector, the son of Priam, by Aeneas, Sarpedon, and other valiant leaders.

For more than nine years the Greeks besieged Troy, with varying fortune. Then Achilles, the bravest and ablest of the Greeks, quarreled with Agamemnon and refused to take further part in the conflict, until the death of his friend Patroclus caused him to go forth once more to seek vengeance. But after slaying Hector, Achilles himself was killed, and the Greeks were in despair. Then the wily Odysseus advised that since they could not take the city by force, they should take it by craft. He devised the stratagem of the wooden horse, by which the Greeks succeeded in taking and destroying the city.

The traveler today may still see the ruins of "the topless towers of Ilium," as Troy was also called. They stand near the coast of Asia Minor, looking across the famous narrows of the Dardanelles at the spot where they open into the Aegean Sea. Looking toward the southeast we can still see snow-capped Mount Ida, on whose lofty height, so the poet tells us, Zeus, king of the gods, sat and watched the conflict. Half-way between the shore and the mountains is a long mound about 100 feet in height, crowned by heaps of debris. This is the so-called Hill of Hissarlik, where for centuries ancient Troy lay buried.

It was long believed that no trace of the city remained, and many even thought the whole story of Troy a myth. Then Heinrich Schliemann in 1870 began to dig down into this mound, and satisfied himself—and ultimately the world—that this was the very spot where the great war was waged thousands of years ago (see Schliemann, Heinrich). The excavations further revealed the fact that several walled cities had stood upon this spot long before Homeric Troy. Where he had come to seek the remains of one town, Schliemann and his successors found the ruins of nine, built one upon another during a period of 3,500 years. First, men of the late Stone Age (about 3000 B.C.) built here a settlement of sun-baked brick houses. When these were beaten down by many storms and rains into a heap of mud, the rubbish was leveled off, and another city built on top of it. So through successive ages layer upon layer was added, until nine cities in all were built, the last in Roman times.

Homer's Troy was the seventh city. This was destroyed by fire about 1200 B.C. The remains of its great walls, 16 feet in thickness, and the flanking towers, which for ten years withstood the assaults of the Greeks, still stand. But the many objects, marvelously wrought of copper, bronze, gold, and silver, which were found here, have been removed to museums. (See also Achilles; Ajax; Hector; Homer; etc.)

The Story of the Wooden Horse

FOR ten years we have laid siege to Troy," said Odysseus (Ulysses), thinking of his dear island-kingdom of Ithaca. "The bravest of the Greeks are dead. Still the city is not ours, and Menelaus is not revenged upon the Trojans for the theft of Helen." He shook his wise head sadly.

"Odysseus, wilt thou not devise some plan by which we can take the city? Our wives and children, with too long waiting, will grow weary. Surely it was given to thee to save us with thy great wisdom." Thus spoke Agamemnon, chief of the Greek kings.

Then Odysseus, aided by the goddess Athena (Minerva), devised the famous trick of the Wooden Horse. He had a Greek sculptor build a colossal horse of wood, big as a mountain. It was large

enough to contain a hundred armed warriors within its hollow interior. Into it crept Odysseus, Menelaus, and others of the Greek heroes. The opening in its side was closed with strong bolts. Then the Greeks broke up their camp and set sail, leaving the Horse.

When the Trojans saw the ships, that had so long been drawn up on the sands of their harbor, sail away toward the island of Tenedos and disappear in the mist, there was great rejoicing, for they thought the Greeks were returning to their homes. Had not they left an image of a Horse as a peace-offering to Athena, who was angered because the Greeks had stolen her statue from Troy?

Some said this, and others argued that it was a Greek treachery, as they ran through the gates, joyful and curious, to gather about the great Horse.

"Put no trust in the Horse, men of Troy," cried the priest Laocoön. "Whatever it is, I fear the Greeks, even bearing gifts." As he departed to offer sacrifice, he hurled his spear against the side of the Horse and there came back a hollow sound.

But his warning was drowned in the shouts of the people, as they watched the approach of some shepherds who brought a captured Greek with fettered hands. Sinon was his name, and he was none other than the trusty friend of the crafty Odysseus who had been left behind to persuade the Trojans by a guileful tale to take the Horse within the gates.

"Have pity on me," he begged. "I escaped from the hands of the Greeks when they were about to sacrifice me to the gods. The Wooden Horse was built as a peace-offering to the offended Athena. It was made of such immense size to prevent you from taking it within your gates. For then the favor of Athena would be transferred to the Trojans."

Some still doubted, but a thing happened before their eyes which seemed an omen from the gods. Two huge serpents rose from the water, and, entwining themselves about Laocoön and his two sons, crushed the hapless ones to death.

"Surely this is a punishment for Laocoön's sacrilege against the sacred gift," cried the Trojans.

Since the gates were not wide enough, a breach was made in the wall and the Horse was brought into the city. That night there was rejoicing. All men went to sleep, secure in the belief that the gods were kind.

But while they slept, Sinon, for so it had been planned, drew the bolts from the door of this "gift to Athena" and out came the hidden Greeks. Then a fire was lighted as a signal to the ships, which had turned back to sight of land. A fair wind and a white moon guided the galleys. Soon thousands of Greek warriors swarmed in the streets of Troy.

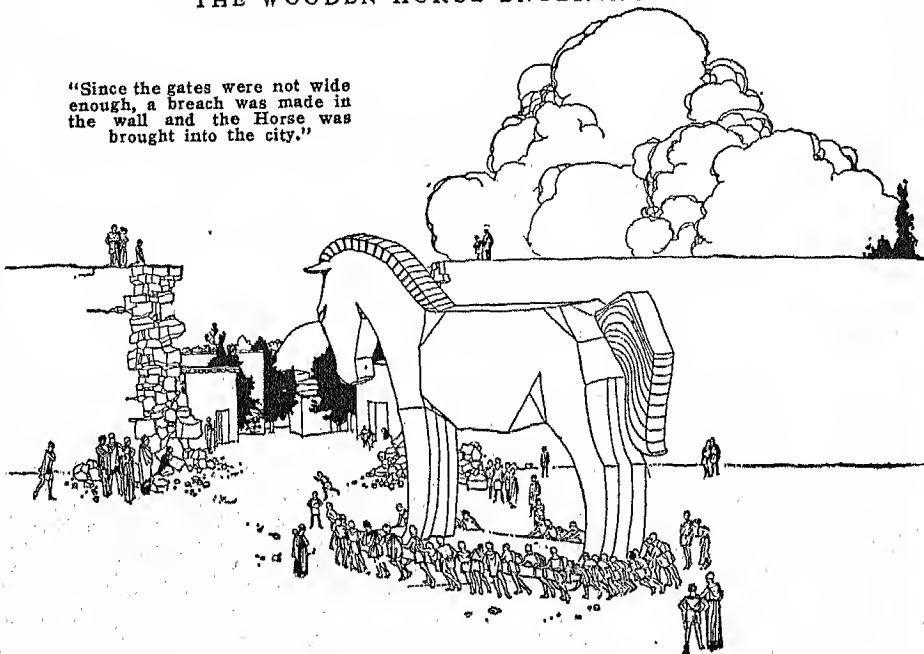
All night the slaughter continued, and by morning only a mass of smouldering ruins marked the place where had stood the proud city. King Priam's headless body lay on the seashore. So perished the Trojans, except for the few who escaped. Helen, for whose sake the dreadful years of war had been waged,

was again in the arms of her husband, Menelaus, and the war-weary Greeks made ready to return to the wives and children whom they had not seen for ten long years.

TROTZKY, LEON (1879-1940). During most of his life Leon Trotzky was a "man without a country," banished from one land after another. He was born in

THE WOODEN HORSE ENTERING TROY

"Since the gates were not wide enough, a breach was made in the wall and the Horse was brought into the city."



the Ukraine of Jewish parents named Bronstein. In 1900 he was exiled to Siberia for his revolutionary activities, but escaped abroad by using a forged passport bearing the name Trotzky. Returning to Russia in 1905, he was again exiled and again escaped.

Early in 1917 Trotzky went to New York City, and became an editor of the Russian Socialist paper *Novy Mir* (the *New World*). After the revolution he returned to Russia and associated himself with Lenin, leader of the Bolshevik movement (see Lenin, Nikolai). When the Bolsheviks overthrew the provisional government (see Russia), Trotzky became commissar for foreign affairs and later commissar of war. He organized the famous "Red Armies," which defeated many attempts to overthrow the Bolshevik government.

After Lenin's death in 1924, Trotzky and Stalin contested for leadership (see Stalin, Joseph V.). Trotzky lost, and in 1929 he was exiled from Russia. While living in Turkey, France, and Norway, successively, he continued through his writings to fight Stalin's régime. In 1937 he sought refuge in Mexico, but in 1940, at his fortified villa near Mexico City, he was assassinated by one of his associates.

In 'The Revolution Betrayed' (1937), one of a number of his books translated into English, Trotzky voiced his indictment of Stalin. Others of his works in English are 'Defense of Terrorism' (1921); 'Lenin' (1925); 'My Life' (1930); 'The History of the Russian Revolution' (1932).

TROUT. No fresh-water fish is more admired, and none provides keener sport, than the trim, handsome trout. These little cousins of the salmon are found in clear streams and lakes throughout the North Temperate Zone. There are two general groups—the black spotted or salmon trout, and the charrs or speckled trout. To the former group, which is nearest akin to the salmon, belong the European brown trout (*Salmo fario*) introduced into America, and the spotted trouts, native to America west of the Rockies. These latter fish include the rainbow, steelhead, and cut-throat trouts, as well as the lovely golden trout of the Sierras. All are more or less dotted with round black markings.

The charrs (*Salvelinus*) wear round spots of a lighter shade than the ground color, and scales so small as to give the impression of smooth skin. They inhabit only the clearest and coldest of waters. The red charr or saibling is a European fish. The American charrs include the golden trout of Sunapee Lake (N. H.), the Dolly Varden trout of the Pacific drainage, and the eastern speckled brook trout, considered by many the handsomest and gamiest of all.

Related to the charrs, but differing slightly anatomically, is the great lakes or mackinaw trout (*Cristivomer namaycush*). This species, which extends north to the Arctic Circle, is important commercially, ranking second to the whitefish in the Great Lakes region. Other fish allied to the salmon and trout family (*Salmonidae*) are the whitefishes and lake herrings; the Michigan and Montana graylings (*Thymallus*), beautiful sport fish of similar habits to the trout, but now unfortunately very rare; and the smelts, delicately flavored marine fish. Most European trout are of the salt-water varieties, entering rivers to spawn as do salmon. (See Fish; Salmon; Whitefish.)

TROY, N. Y. One day in 1825, the story goes, Hannah Lord Montague of Troy cut the collars off her husband's shirts so that she could launder them separately. By this act she created the industry that was to make Troy the "collar capital of the United States." In 1829 Ebenezer Brown hired women to make detachable collars to sell in his store, and a few years later the first collar factory was established.

Even before this Troy was on the way to becoming a manufacturing town. In 1809 John Brinckerhoff of Albany started a nail factory here. Henry Burden, who came in 1822, invented machines to turn out horseshoes and railroad spikes. These inventions and his improvements in iron manufacturing methods stimulated the already growing industry, and until the late decades of the 19th century Troy was an important iron center.

It is advantageously situated to be a manufacturing center. At the head of navigation on the Hudson River, six miles above Albany, it has water transportation to the ocean. Dams on the river and on two swift streams, the Wynantskill and the Poestenkill, early provided cheap water power. Today it is also served by the State Barge Canal and four railroads. Besides men's collars, shirts, and other garments, Troy's varied manufactures include valves, fire hydrants, bells, and chains; engineering and surveying instruments; brushes, paper, and munitions.

The city rises eastward from a narrow plain along the river to hills some 400 feet high. It has three noted educational institutions—Emma Willard School for girls; Rensselaer Polytechnic Institute, the oldest engineering school in the country; and Russell Sage College for women.

Members of the crew of Henry Hudson's *Half Moon* explored the river as far as the site of Troy in 1609. In 1630 the Dutch West India Company granted the land to Kiliaen van Rensselaer. The town was laid out in 1786. Lansingburgh was annexed in 1901. Population (1940 census), 70,304.

The USE and CONTROL of PROPERTY in TRUST

How a Form of Land Tenure in Feudal Times Developed Under the Common Law and Became the Legal Foundation for Modern Industrial Monopolies

TRUSTS. In the United States the word "trust" is used to describe several forms of business or industrial organizations, unrelated in purpose and scope, but originally having a similar legal basis. In a legal sense a trust is a property interest held by one man for the benefit of another; perhaps its meaning will be clear when you realize that it was once also called a "use." The trust is generally regarded as an outgrowth of the feudal system of land tenure, under which the land belonged to the overlord while its use belonged to the vassal. By this system, if a landholder's heir was a minor, the land passed under the control of the overlord until the heir became of age. The overlord could and frequently did despoil the land; and the heir also had to pay a considerable fee to obtain his inheritance. To avoid these hardships, the custom grew of transferring or bequeathing the land "in trust" to an adult, with the understanding that he would transfer it to the heir when the latter came of age.

Under English common law such a trust, although it had an existence apart from the trustee and the beneficiary, was not a corporation, and was not subject to the special laws relating to corporations (see Corporations). A trust agreement provided the machinery by which groups of property owners might act as a unit without any one of them being personally liable for the acts of the trust. In some states where the laws do not permit corporations to hold real estate, trusts of this type are still common. In this type of trust, certificates of beneficial interest may be issued to each beneficiary, exactly as shares of stock are issued to a stockholder in a corporation. When American "big business" men were looking for a form of organization which would give them the advantages of corporate organization without the disadvantages of governmental regulation, which was then applicable to corporations only, the trust was an instrument ready at hand.

The first great industrial trust was almost instantly associated in the public mind with monopoly. In ten years, beginning 1870, John D. Rockefeller and his associates had acquired control of about 95 per cent of the oil refining business of the United States. Their methods caused such indignant protests from a congressional committee and from the public that the refiners dissolved the corporation by which the group maintained its hold. As a substitute they organized a board of nine trustees, who held the legal title to stock in more than 30 corporations, with property in as many states. The stockholders of the different companies, in return for the stock which they signed over to the trustees, were given receipts or trust certificates, and the dividends paid by the various companies were then prorated among the holders of the certificates.

The Growth of Trusts

The Standard Oil trust was secretly formed in 1882. Soon this form of organization was used in other businesses. The public did not understand the legal structure, but talked about the tobacco trust, the sugar trust, the meat trust, and even the money trust, as if they were all organized on the same plan. Some of the trusts did not succeed, but those which did owed much of their success to business practices which we should now consider bad.

Among many other practices, the trusts were accused of cutting prices below actual cost and selling at a loss to drive out competitors whom they could not buy out. Then, with the field clear, they could fix prices as they chose, regaining their losses at the public's expense. They made secret arrangements with railroads by which they received special favors, such as rebates or refunds of part of the freight paid. The men responsible for the formation of trusts were often influential directors in banks and other corporations; through the system of "interlocking directorates" they had access to information about their competitors, and they often used this information to their own advantage.

The Anti-Trust Movement

By 1890 the word trust popularly meant bad trust. In that year Congress passed the first anti-trust law, named for its author, John Sherman. This law stated in its first section: "Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several states or with foreign nations, is hereby declared to be illegal."

At first the Federal government acted on the theory that all trusts should be dissolved. The Standard Oil trust was broken up in 1892, but reappeared as a corporation organized under the laws of New Jersey. This state, and later Maine and Delaware, became the favorite domiciles for "big business" because of the wide powers granted to corporations organized under the state laws. The Federal government was successful in its battle against the new Standard Oil Company, which was dissolved again by court order in 1911. Following the depression which began in 1929

there appeared a new tendency towards consolidation, along economic lines and with government approval; for example, the Standard Oil Company of New York which made and sold gasoline only, was permitted to absorb a company, also one of the "Standard" group, which manufactured lubricating oils.

The Sherman Anti-Trust Act, in spite of the successful prosecution of the Standard Oil group, was not effectual. In 1914 Congress passed the Clayton Act, forbidding restraint of trade by unfair price discrimination, or interlocking directorates or holding companies when such directorates or holding companies might tend to "lessen competition or create a monopoly." The act particularly stated that regulations relating to combinations should not apply to combinations of labor, such as labor unions. At the same time a law was passed creating the Federal Trade Commission (*see* Federal Trade Commission).

In 1920 the Supreme Court ended a ten-year battle against the steel trust, by ruling that the public interest would suffer if the United States Steel Corporation were broken into small units. The International Harvester Company won a hard battle when the Supreme Court refused to dissolve it, although it controlled about 64 per cent of the harvesting machinery business. The government, however, succeeded in getting a decree from the Supreme Court (1920) forbidding the meat packers to engage in related lines, such as the operation of stockyards and the manufacture and distribution of other food products. In 1931 a lower court decision modified this decree on the ground that chain-store systems made it impossible for any one organization to control food prices, but the following year saw this decision set aside by a new ruling of the Supreme Court. (For further details of the trust movement *see also* McKinley, William; Roosevelt, Theodore.)

Present-Day Forms of Trusts

Originally trusts were formed by a combination of competing firms, each making the same articles. These are known now as horizontal trusts. There are two other general classes, vertical trusts and circular trusts. A vertical trust is a combination engaged in successive operations leading to one finished product; that is, the finished product of one is the raw material for the next. A circular trust is a union of enterprises engaged in allied or complementary lines, usually selling through the same channels or in the same markets.

An excellent example of the circular type is a nationally known paint and varnish company. First it bought zinc and lead mines, to assure raw materials, and then it opened a number of wholesale and retail stores to assure an outlet. One day, in buying out a competitor, it also had to buy a margarine factory. Margarine is a vegetable product, and is sold with a rapid turnover on a small margin of profit; in these respects it is almost diametrically opposite to paints and varnishes. The two opposites seemed to provide a desirable stabilizing factor. The next step was

to buy out a manufacturer of coconut oil, from which margarine was made, then a company which sold shredded coconut in packages, and then, having meanwhile experimented with other vegetable oils, to make salad dressings and meat sauces. At first glance it seems strange that a zinc mine and a salad dressing factory should be under the same management, yet the process is logical and the business is successful.

One trust may fall into all three classes; it may include many plants turning out the same product; it may control all or practically all the raw materials it needs, and the industries through which this raw material moves to the finished product; and it may control many allied interests, including the sale of the completed products. This three-way combination insures itself a steady flow of the materials it needs at lowest prices; what might be waste is turned into profit by utilization of by-products. The by-products may be sold through the one central organization. All these benefits, in the savings effected by mass production and mass distribution, are shared by the public (see Economics).

Combines and Cartels in Europe

In Europe the industrial trusts have been mostly of the horizontal type, but the vertical and circular trusts are now spreading. The European combine, as it is called in England, or cartel as it is known on the Continent, is usually a loose pool that uses methods exactly like those which caused trouble for the early American trusts. The members agree that each shall produce just so much; shall sell it at a certain top or bottom price; and often agree as to an allotment of markets. Belgium, a highly industrialized nation, saw its first cartel in 1841, in coal. The original German cartel was formed in 1884 by agreement among four potash companies. Great Britain's first great trust was an outcome of the American tobacco war in 1901. This was the British-American Tobacco Company, one of the first foreign cartels in which American capital was interested.

In Europe the greatest problem for industry has been to find an outlet for the vastly increased productive capacity brought by mass production and more especially by expansion during the first World War. An early result of the pressure for markets was the formation of international cartels. Patents, trademarks, secret processes, especially in the chemical industries, are factors in bringing together the various countries into such agreements. The home market, as a rule, belongs to each country; in the allotment of foreign markets consideration is given to factors such as distance and transportation costs, previously established trade relations, and commercial treaties. A country with colonies will naturally have prior trade rights in those possessions.

Great Britain, Germany, France, and Belgium formed the first international cartel in 1884, for the control of steel rails. Later the American rail manufacturers joined. At first the Americans were at a disadvantage, because the Sherman Act and the Clayton

Act forbade such combinations, but under the Webb-Pomerehne Act of 1918, they were permitted to join such combinations for foreign trade, as in the case of the international sugar cartel formed in 1931 to control surplus. The National Industrial Recovery Act of 1933 permitted formation of cartels for interstate commerce, subject to approval and revocation by the president or officials he designates. The term "marketing agreement" is commonly applied to such an arrangement.

Growth of Investment Trusts

Investment trusts are founded on the theory that investing is a business or profession calling for special training and special facilities not available to the general public. There are two types of investment trusts, *fixed* and *management*. In the fixed trust the securities to be purchased are selected in advance by the promoters or underwriters. The trustee may buy these securities only, and only in the proportions fixed in the trust. The list of stocks bought, and the proportions, are always known to the investor. The chief advantage of this trust is that the small investor can diversify or spread his investment over a number of industries and companies; by buying one share in the trust he automatically acquires an interest in the 40 or 50 companies whose stocks are held in the trust. The term "fixed trust" does not mean that the investor's money is permanently tied up; he may at all times dispose of his certificate of interest by selling it, or under certain conditions he may acquire his proportion of the actual shares held in the trust.

The term "management trust" is a misnomer; it should be called an investment fund. Most management trusts are organized as corporations, officered by men who receive salaries and sometimes also a share in the profits for their services. The managers usually have entire discretion as to disposal of the funds. The early management trusts in the United States concealed as much information as they could and still persuade investors to advance funds, believing that other managers and investors would follow their lead if their list of holdings was made public. National legislation in 1933 and 1934 required regular reports, before shares could be sold or listed on a stock exchange. Most such trusts, however, had previously adopted the practice of publishing reports, including security holdings, at least once a year. Leading stock exchanges also had come to require reports, before shares in such trusts could be listed.

A few investment trusts issue only one class of capital stock and do not borrow money; but most investment companies are financed by the sale of bonds or preferred stocks in addition to common stock, or by some combination of the three. (See Stocks and Bonds.)

Trust Companies

The tendency of people to employ financial specialists is shown again in the development of trust companies and trust and savings banks. The operations of trust companies cover almost every phase of the control and distribution of money, securities, and

physical property. Probably their most important function is the administration of estates. By the so-called living trust, a trust company manages property for the benefit of a living owner or for others at his direction. The charitable trust sets aside property to be managed for the benefit of stated charities. The life insurance trust provides that life insurance be collected and the proceeds invested for the benefit of the heirs.

One-third of America's developed wealth, perhaps more, is now under trust management. The life insurance trust was the first to become popular, and there is over \$1,000,000,000 of life insurance delegated to trusts. Yet this is but a fraction of the \$100,000,000,000 of life insurance in force, so the continued expansion of such trusts seems assured.

Strict laws governing trust institutions give the public faith in them. The successful trust company must have experts to handle intricate legal tangles involving taxes of many sorts; often it must be able to step in and manage great business enterprises; it safeguards securities of many varieties, collecting the returns as they come due and distributing them. Many large companies have corporate trust departments which act as trustees under mortgages pledged by corporations to secure bonds, and often arrange the financial end of business organizations or dissolutions. As trustees they receive funds from the corporation for the payment of interest and principal on bonds, and they also serve as paying agents for city, county, state, or other governments in handling bonds. In a few large cities there are trust companies which carry on no other activities, but in most cases trust business is handled by the trust department of a large bank.

TSCHAIKOVSKY (*chä-köf' skē*), **PETER ILYITCH** (1840-1893). *Savage* gaiety and profound melancholy, strange varied rhythms and a taste for strong color—all these national traits of the Russian people are represented in the music of Tschaikovsky, whom many consider Russia's greatest and noblest composer.

The son of a mining engineer, he was born in the iron-mining town of Votkinsk, in the Ural Mountains, just at the time when Russian musicians were working to establish a national music. Although he first studied law he was always an enthusiastic lover of music, and at 21 he began the serious study of that art in the conservatory of music in St. Petersburg (Leningrad). Five years later he was graduated

with honors and was appointed professor of harmony in the Moscow conservatory. His operas, produced during the next ten years, were unsuccessful, and his orchestral compositions were received with indifference. This fact, with hard work and personal troubles, caused a serious break in health and led to his retirement from teaching.

Tschaikovsky's fame as a composer came late in life and was due mainly to his orchestral music. His ballets 'Sleeping Beauty' and 'The Nutcracker Suite' and his 'Pathétique' symphony are, in foreign lands, the best known of his compositions.

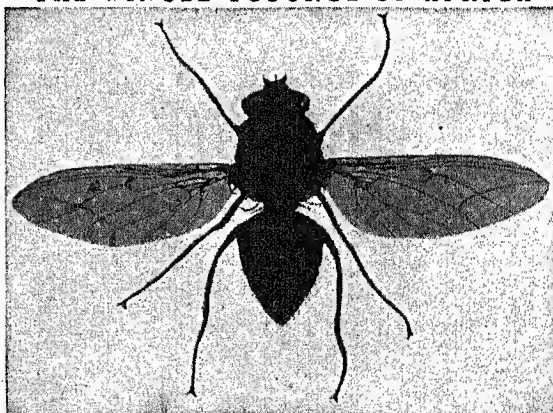
TSETSE (*tset'se*) **FLY**. One of the greatest scourges of man and animals in the tropical regions of Africa is this blood-sucking fly, a little larger than our common housefly. By its bite tiny parasites are introduced into the blood of its victims. These parasites produce the dreaded sleeping sickness in man, and in cattle, horses, dogs, and other domestic animals they cause the disease known as *nagana*. Hundreds of thousands of natives have died of sleeping sickness, which is so called because the victim in the last stages falls into a *coma* or sleep which ends in death. The disease has been known for more than a hundred years, but it was not until early in the 20th century that men discovered that it was disseminated by the tsetse. The female has a unique mode of reproduction; instead of laying eggs she deposits on the ground a single full-grown larva at intervals of about two weeks. The fly breeds chiefly in brushy undergrowth and does not go far afield. Burning fly-infested regions and clearing out the brush in the neighborhood of settlements are helpful control measures.

Sleeping sickness is now being treated by a drug of German make called Bayer 205, by tartar emetic, and by certain compounds of arsenic, especially atoxyl and tryparamide, the latter a product of the Rockefeller Institute and the most successful of these remedies.

TUBEROSE. Once borne upon the crest of fashion,

this flower has so fallen in esteem that there are now few who do it honor. There are two causes for its decline, the almost sickening sweetness of the flower and its funereal associations. The tuberose is not related to the rose, as people often imagine. The popular name is a corruption of the technical name *tuberosa*, given the plant because it springs from a tuber-like rootstock. The slender stem, often three feet high, bears clusters of stiff white blossoms, and 6 or 8 sword-shaped leaves. Although a native of

THE WINGED SCOURGE OF AFRICA



The dreaded Tsetse Fly, which produces the sleep that ends in death, is only a little larger than our common housefly. The specimen here shown is greatly magnified. If it were alive and feeding, the gossamer wings would be folded against the body like a pair of scissors.

tropical Asia and America, it is now cultivated extensively in France, Italy, and the United States. The factories in France are said to use 80,000 pounds of tuberoses annually in the manufacture of perfume.

Scientific name, *Polianthes tuberosa* of family *Amaryllidaceae*. Flowers white, waxy in texture; about 1 to 1½ inches long; tube long, funnel shaped; segments are short and unequal, 6 stamens inserted on the middle of the tube; 3-celled ovary; 3 stigmas.

TUDOR. A reigning house of England which came to the throne in 1485, in the person of Henry VII, and numbered among its other members his descendants Henry VIII (reigned 1509-47), Edward VI (1547-53), Mary (1553-58), and Elizabeth (1558-1603). The family traced its descent on the male side from the Welsh border lord, Owen Tudor. Its claim to the throne was based on the marriage of his son Edmund to a Lancastrian princess of the Beaufort line. The future Henry VII (known as the Earl of Richmond) was the son of this union, and the only remaining claimant of the Lancastrian line. He made two attempts to win the throne, in the second of which the last Yorkist king, Richard III, was defeated and slain at Bosworth Field (1485). Henry VII was crowned with the fallen monarch's crown, picked up on the battlefield. After his coronation he ended the Wars of the Roses by uniting the houses of York and Lancaster through his marriage to Elizabeth of York, the heiress of that house. The Tudor rose, which typifies this union, represents a red rose superimposed upon a white.

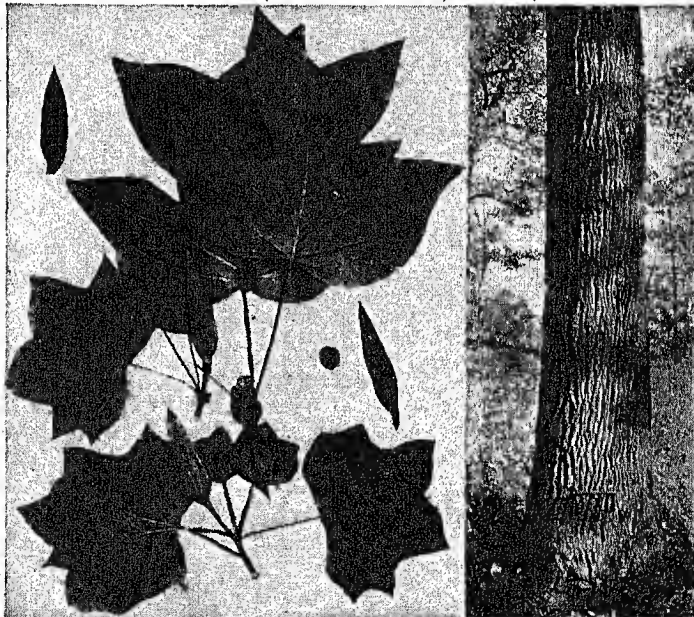
TULIP. No flower of our garden presents a more gorgeous spectacle or a greater variation in form and color than the tulip, which belongs to the genus *Tulipa*, and is a member of the lily family. By cross-breeding, florists have produced thousands of varieties. There are the single and double early tulips, and the taller and still lovelier late tulips that vie with the rainbow in the bravery of their coloring. The large glowing blossoms, rising above the long outward-turning green leaves, look like a stately array of brilliant-hued floral urns. Very striking are the solid-colored flowers of white, yellow, orange, bright red, or dusky purple; and very dainty and artistic are those whose petals are stained with contrasting shades. Among the latter are the flamed rose tulips of white splashed with pink, soft rose, cerise, or deepest crimson; and the feathered rose tulips etched about the edges in the same beautiful shades. Other varieties have a ground of lemon or deep yellow, painted in like manner with dazzling hues.

The tulip is a native of Asia. It was brought into Europe by way of Constantinople about three centuries ago, and became the flower of fashion for over

a hundred years. As early as 1600 Holland—even then a flower-loving country—became the center of its production, and now millions of bulbs are cultivated there each year for export. In 1634 began the "tulip mania," an astonishing craze for speculation in tulip bulbs, which were sold by weight like diamonds, sometimes hundreds of dollars being paid for a single bulb. Admiration for the flower and interest in its culture were secondary matters in this wild gambling, which lasted for four years. Today the wide popularity of the tulip is largely due to the fact that its masses of dazzling color decorate our parks and gardens while most of the other vegetation is yet in the bud.

TULIP TREE. This tall slender tree, crowned by a cone-shaped mass of glossy, bright green leaves, is one of the most magnificent of forest trees. In spring its large brilliant tulip-shaped flowers of greenish yellow streaked with red and orange are an added beauty. The tree has been known to reach a height of 190 feet, though it ordinarily grows from 70 to 100 feet. It is easily recognized by the unique shape of its leaves and their peculiar manner of developing. As in many

THE TULIP TREE, ITS LEAVES, BUDS, AND SEED



You can always recognize the Tulip Tree among the other tall residents of the forest by its leaves and its leaf-buds, which, like a pair of little hands, inclose and protect the young leaves against changing temperature until they are old enough to take care of themselves.

other trees, the leaf-buds are composed of scales that grow with the growing shoot; what is unusual is that each pair of scales develops so as to form an oval envelope which incloses the young leaf and protects it against changing temperatures until it is strong enough to bear them without injury. At that stage the bracts separate and the tiny leaf comes out carefully folded. As it matures it unfolds into a broad four-lobed leaf, peculiarly cut off at the apex, giving it

a square appearance across the top. The tulip tree is never abundant, and it is seldom that more than a few good-sized specimens are found in an acre of forest ground. It is rare in New England and west of the Mississippi, but is found in deep loamy soil along the southern shore of Lake Erie, and on the borders of swamps and bottomlands of rivers westward to Illinois and south as far as Alabama and Georgia. In the West it is called a "poplar"—largely perhaps because of the fluttering habit of its leaves and because it is the source of much of the so-called poplar lumber used for the interior finish of houses, coffin boxes, woodenware, etc. The color of its wood has also given it the name whitewood; among early settlers it was called canoe wood, because the Indians so habitually used its trunk for their dugout canoes.

Scientific name, *Liriodendron tulipifera* (Magnolia family). Bark brown, furrowed, aromatic, and bitter. Wood light yellow to brown; sap-wood creamy white; light, soft, straight-grained. Leaves alternate, simple, feather-veined; 5 to 6 inches long, growing on long, slender, angled petioles; they turn bright yellow in autumn. Flowers 6 inches across, solitary, erect, cup-shaped, blooming in May.

TULSA, OKLA. Cowboys around the village of Tulsa in 1901 hooted at prospectors who drilled for oil. But when the glistening "liquid gold" spurted up near Red Fork a few miles away, indicating the possibilities of a rich new field, the town turned its efforts to serving the oil men and invited them to make their headquarters there. Banks and business organizations sprang up to meet the needs of the industry. Soon Tulsa became a great operating center of the Mid-Continent field and Oklahoma's second city. It is called the "oil capital of the world."

It lies on the Arkansas River in a rich agricultural region in the northeastern part of the state. Besides refining oil, it manufactures oil-field and refinery equipment, technical instruments, structural steel, airplanes, chemicals, salt, bricks, glass, boxes, and clothing. There is also a large stockyard.

Office buildings shooting 20 stories high, splendid homes with landscaped grounds, and a fine system of parks give evidence of the city's wealth. This wealth has provided many cultural facilities, notably the Tulsa Civic Symphony, the Tulsa Art Center, the Little Theater, and the Philbrook Art Museum. The University of Tulsa, founded in 1894 at Muskogee as Henry Kendall College, was moved to Tulsa in 1907. Among the many beautiful parks are Mohawk Park with its lakes and zoo and Woodward Park with its formal rose garden.

Gravity brings Tulsa's water supply 55 miles down a slope of only 90 feet from Spavinaw Dam in the Ozarks. The city has a municipal airport and a flying school. The International Petroleum Exposition is held here every two years. Three railroads and several important highways pass through the city.

Tulsa gets its name from Tulsa Lochapoka, the name given the community by the Creek Indians, who came to the territory in 1836. In 1882 the Frisco Railroad reached Tulsa, then principally a trading post for Indians and adventurous pioneers. Population (1940 census), 142,157.

TUNGSTEN. Although known to science for more than 150 years, tungsten was considered useless until a comparatively few years ago. Today this element is so much in demand that its ores have sold for as much as gold ores.

Its name comes from the Swedish *tung* meaning heavy, and *sten* meaning stone. It is, indeed, one of the heaviest of substances, weighing almost twice as much as lead. It has the highest melting point among the metals (6,100° F.) and its general resistance to the effects of heat chiefly accounts for its value. The targets in X-ray tubes, which must withstand enormous temperatures, are made of tungsten (see X-rays). It is also the most useful material for filaments in electric lamps and radio tubes, because it can be kept at white heat for a long time without undue softening. For the current they consume, tungsten filaments give from two to five times as much light as the old carbon filaments. It has been estimated that this alone saves the United States \$1,000,000,000 a year on its light bill. (See Electric Light and Power.)

A Boon to Electric Lighting

The difficulty of drawing this extremely hard and brittle metal into fine wires delayed for years its adoption for lamp filaments (see Wire). The solution of this problem by W. D. Coolidge of the General Electric Company's research laboratories at Schenectady, N. Y., revolutionized the lighting industry in 1912. He molded tungsten powder into rods and beat them with mechanical hammers in the fierce heat of the electric furnace until they were small and tough enough to be drawn through finishing dies.

Now we have tungsten wires so fine that six of them would hardly equal the diameter of a human hair, yet equal in strength to copper wire ten times their size. In general, the tensile strength of tungsten treated by the method described above exceeds that of any other known substance, since a rod one inch square can support more than half a million pounds.

Important as is this use of tungsten in radio tubes and electric lamps, it requires only a small part of the annual production. More than nine-tenths of the output is used in making "high-speed" tool alloys for machining metals. Among these are the alloys of tungsten carbide with cobalt, which are the hardest compounds known to science. (See Alloys.)

Hard to Extract from Ores

Tungsten resists the action of most acids and other corrosives at ordinary temperatures, and the consequent difficulty of extracting it from its ores is in part responsible for its cost. Most of these ores (chiefly *wolframite*, *hübnerite*, *scheelite*, and *ferberite*) are mined in China, Burma, Federated Malay States, Nevada, Colorado, California, and Arizona. They are often found with tin ores. The United States mines from one-half to two-thirds of the tungsten it uses.

Tungsten (chemical symbol W, from the German *wolfram*) was first isolated in 1783, several years after its original discovery by K. W. Scheele in the form of tungstic acid. Sodium tungstate impregnated in cloth makes the cloth fire-resistant. Lead tungstate makes a good white paint.

TUNISIA, AFRICA. There is hardly a region on the globe that can boast so varied a history or so mixed a racial ancestry as the French protectorate of Tunisia—that huge mountainous shoulder which North Africa thrusts so abruptly into the Mediterranean. Only 80 miles of open water separates Cape Bon at the tip of this shoulder from the island of Sicily, and the Mediterranean peoples have streamed back and forth across this narrow stretch since the dawn of history.

Egyptians, Phoenicians, Greeks, Romans, Vandals, Jews, Arabs, Negroes, Turks, Spaniards, Italians, and French have all had a hand in shaping the destiny of this rocky promontory. Yet none of them has ever wholly conquered it, for that most ancient white race of the Mediterranean lands, the stubborn Berbers of the Tunisian uplands, dwell there today in comparative freedom and purity of race just as they did when the earliest Egyptian and Phoenician navigators touched those shores more than 30 centuries ago.

There, on a projection in the Gulf of Tunis, stood ancient Carthage, and high on a hill above rose the temple of Moloch, the terrible bronze god into whose fiery mouth children were thrown, while the frenzied Carthaginians prayed for victory over Rome. On the horizon on the other side of the gulf rises a mountain chain, the last eastward spur of the Atlas range, which was the scene of so many fierce struggles between Carthage and Rome and between Rome and the Vandals (*see Carthage*). Closer at hand is the Hill of St. Louis, bearing a church to commemorate the spot where the great king of France died of the plague in 1270 during the last Crusade.

Across the plain west of the site of ancient Carthage run the remains of the great Roman aqueduct, which brought water from the mountains 56 miles away. Up near Cape Blanc, the northernmost tip of the African continent, is the site of ancient Utica, founded by the Phoenicians three centuries before Carthage.

This entire region is as rich in ancient Latin remains as central Italy, for this was the land first called "Africa" by the Romans, the granary of the empire, and next to Rome the most important foreign center of Roman civilization after the power of Carthage was broken, and after the Numidians, as the ancient Berbers were called, had been pacified. Here, too, the early Christian church had glorious days, made famous by the names of St. Augustine, Ter-

tullian, Cyprian, and other great theologians. After the Vandals under Genseric founded a kingdom here (*see Vandals*), the Emperor Justinian of the eastern Roman Empire reconquered the land in 534. In the 7th century it passed under Mohammedan rule and

rose again to great power. In 1535 the Spaniards under Charles V wrested the seacoast from the famous corsair Khair ed Din ("Barbarossa"). Forty years later it was seized by the Turks and remained part of their empire until the French took control in 1881. During the second World War, Tunisia again became a battlefield, and here culminated the campaign that ejected the Axis forces from North Africa in 1943 (*see World War, Second*).

The city of Tunis, capital of Tunisia, is reached by ocean steamers from the Mediterranean by a deep channel and the Bay of Tunis. This is one of the most picturesque capitals of the world. The European quarter has been built up outside the old town, which retains its ancient Mohammedan atmosphere. Not only are the people a mixture of all the races who have passed through the land, but the very buildings are con-

structed in large part from fragments of the old Carthaginian and Roman structures.

The chief crops are wheat, barley, grapes, dates, olives, and a wild grass called alfa or esparto, used for weaving and paper making. The numerous live stock include sheep, goats, cattle, horses, donkeys, mules, and camels. Chief exports are olive oil, wheat and flour, wine, esparto, phosphate rock, iron ore, and lead. Under French administration, the resources of the protectorate have been developed. Large areas have been brought under cultivation by irrigation. Native towns have become well-built cities, with schools and hospitals, and a great system of motor roads has been constructed.

Within Tunisia's area of 48,300 square miles live some 2,600,000 people. The native Moslem people—Berbers, Arabs, and Bedouins—make up about 90 per cent. The remaining 10 per cent are mainly French, Italians, and Jews. The Italians, who are almost as numerous as the French, have made trouble by insisting on special privileges and clamoring for annexation of Tunisia by Italy. The nominal ruler, the bey of Tunis, has little power. Actual administration of the protectorate is in the hands of a French resident general.

The most important coastal cities and their populations are: Tunis, about 220,000; Sfax, 45,000; Sousse, 28,000; and Bizerte, an important naval base, 26,000. Inland from Sousse, lies Kairouan (population, 23,000), the "holy city" of the Mohammedans in Africa.

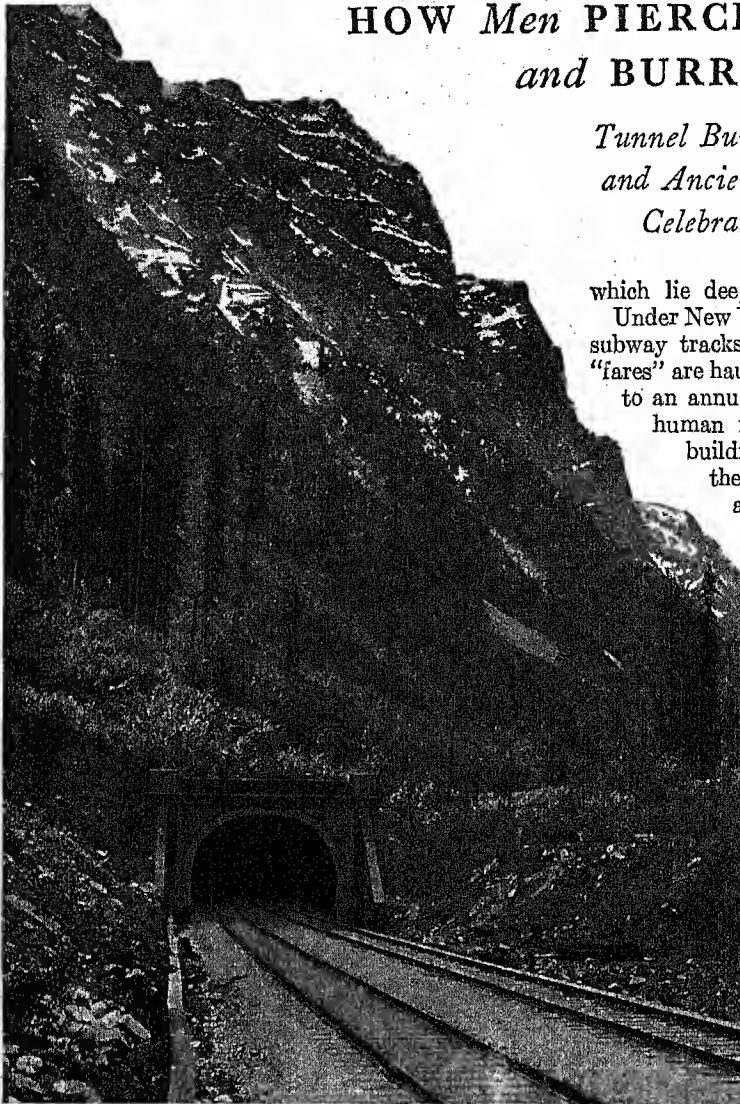
IN OLD TUNIS



Here we are in the older part of Tunis with its narrow arched streets. The man in the foreground is a water carrier plying his trade from house to house.

HOW Men PIERCE MOUNTAINS and BURROW under RIVERS

*Tunnel Building in Modern
and Ancient Times—Some
Celebrated Examples*



which lie deep down beneath the city pavements.

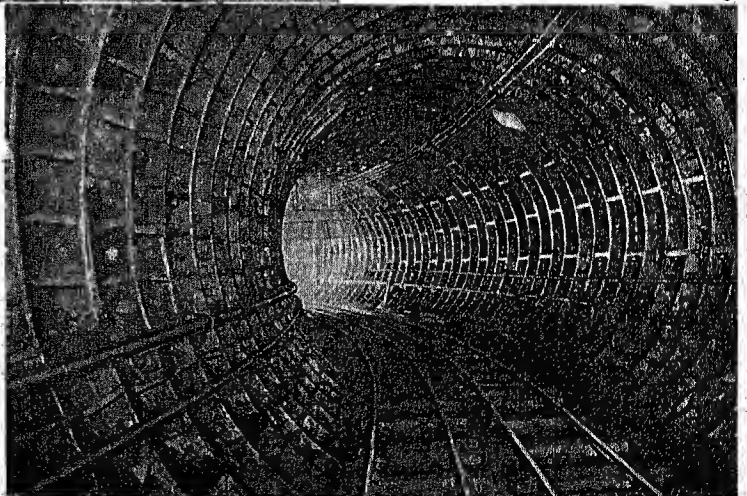
Under New York City alone lie nearly 1,000 miles of subway tracks, over which not far from *two billion* "fares" are hauled during the year. This is equivalent to an annual trip for every living member of the human race. Here is an example of tunnel building to escape congestion of traffic at the surface. More spectacular, however, are the tunnels dug to circumvent natural obstructions and barriers, such as mountains and rivers.

The first step in tunnel construction is to prepare a geological map showing the nature of the earth to be penetrated, the probability of encountering water, etc., for upon these difficulties depends largely the cost of construction. Then a guide line for excavating, called the tunnel "center line," is established by surveyors. Next, the difference in elevation between the two ends is ascertained; the shape and inside dimensions are decided upon; and then finally the

In early days Canadian Pacific trains had to cross the Selkirk Range by zigzagging for 13 miles over Rogers Pass. Since 1916 they "dive under" through the five-mile Connaught Tunnel, seen above at its east end. Below we see one of the New York-New Jersey Hudson River "tubes" in process of construction. Note the stout cast-iron lining.

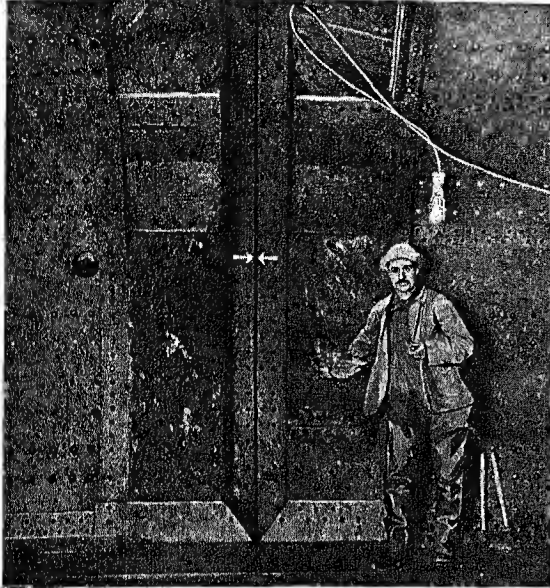
TUNNELS AND SUBWAYS.

Beneath the surface of the earth—under rivers, through mountains, and below the sidewalks of cities—men have built vast systems of transportation by tunnels. The most extensive systems of underground traffic are the passenger subways of the great metropolitan centers. To the constantly growing list of cities with subways—New York, London, Moscow, Tokyo, Berlin, Philadelphia, Boston, and others—Chicago in 1938 added its name, when it launched the sixteenth subway of the world. Now millions of people in these cities daily travel back and forth in electric cars driven swiftly through great "tubes"



excavating begins. Open-cut tunnels are often constructed by first removing the overlying material (by open excavation if on land, or by dredging if under

A PRODIGY OF ENGINEERING



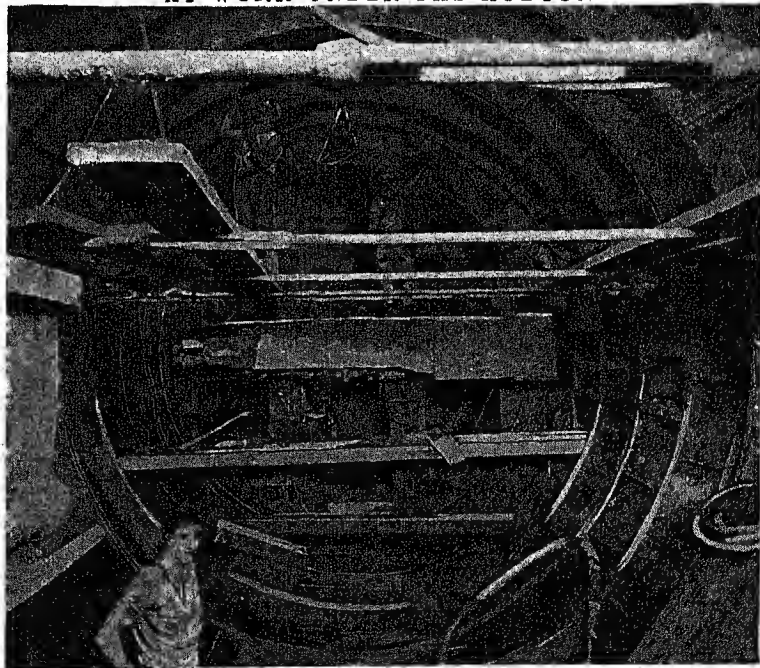
These two shields, whose front edges you see touching each other at the center, have been driven under the river from opposite directions with such marvelous accuracy that they met squarely and in perfect alignment. This feat was accomplished in making one of the railroad tunnels under the North River between New York City and the New Jersey shore. Failure would have meant an enormous extra expense.

clay and sand. Cast iron lining is sometimes used, particularly in tunnels at considerable depths below the surface of water. The iron is made in cylindrical sections from two to six feet long and one or two inches thick, and these are bolted together when put in place. Sometimes they are further lined with masonry.

Small dump or tram cars carry out the excavated material. Often vertical holes or shafts, braced with timber, are sunk from the surface so as to attack the excavation from additional points, the work being extended both ways from where the shaft is sunk. Men, materials, and tools are raised and lowered through shafts in power elevators. Sometimes the shafts are filled in again after the work is completed; sometimes they are left permanently for ventilating the tunnel. Occasionally the digging of a tunnel starts at each end, the workmen meeting in the center. In the Rogers Pass tunnel, British Columbia, a small "pioneer tunnel" was driven first. "Side-cuts" were then made and gangs worked from their ends to build the main tunnel.

Hard rock is the easiest material to tunnel through, as it is easily broken up by blasting, and the masonry lining may usually be completed without much timbering. Submarine tunneling is more difficult. If the water which seeps down into the excavation cannot be kept out by pumping, use must be made of compressed air, or a *shield*, or both. The shield, one of the most valuable of engineering inventions, is a steel-plate cylinder or shell, from 6 to 30 feet in

AT WORK UNDER THE HUDSON



Here we are within a shield watching the "sand-hogs" at their work. At the forward end you see the bulkhead through openings in which excavated material is removed. When the men are digging, compressed air is forced into the shield at high enough pressure to keep the water from entering.

water), completing the tunnel structure, and then refilling over it. Open-cut tunnels are often used in constructing subways.

Large tunnels are seldom driven as one big hole; that is, the whole area of a cross-section is seldom removed at once. Instead, the cross-section is divided into several segments and these are started one at a time. Thus several gangs can work at once, the first gang to start always being farthest along.

The sides and top of a tunnel are usually supported by a lining, even in hard rock. Temporary lining is always set up when working in soft material, to prevent "cave-ins," and is replaced by the permanent lining as the work progresses. In such cases, the first structure is of timbers and cross-timbers. The permanent masonry—brick, stone, or concrete—may be from one to five feet thick, the greater thickness being used in such soft heavy material as wet

length and 40 to 80 tons in weight, inside of which the excavation and the construction of the tunnel lining are carried on. Thus the inrush of water and soft material during the excavation is prevented. Inside the shield is a vertical bulkhead partition or diaphragm with openings whose doors can be quickly closed if necessary. Through these, laborers excavate the material in front of the shield, taking it out in the rear. The forward end of the cylinder is a strong cutting edge; and as the digging proceeds, the shield is thrust forward into the soft earth by the power of hydraulic jacks; and the tunnel lining is constructed within the rear of the cylinder, the latter always overlapping the completed lining by several feet. In the compressed air system the end of the tunnel where the digging is going on is filled with air under sufficiently great pressure to keep water from entering.

A method much used in the United States at small depths under river bottoms consists in constructing cylindrical steel sections, closing their ends with wooden bulkheads, then floating them into position and sinking them into a trench dredged in the river bottom. The sections are successively joined and lined with concrete inside and out. This was the system used in the tunnels built under the Harlem River for the New York subway tracks.

Tunnel building is one of the oldest of engineering operations. It was practiced by most ancient peoples, including the Egyptians and natives of India, who built them for tombs and temples; the Assyrians, and even the Aztecs in America. All work was done by hand and so was infinitely slow and laborious. The Romans, the greatest of ancient engineers, developed the scheme of sinking shafts to afford additional digging points, and the "fire-setting" method—heating the rock by fires and then suddenly chilling it with water to crack it. Vinegar was often used, and thus chemical action hastened disintegration. The Roman tunnels were built chiefly for their celebrated aqueducts and highways. During the Middle Ages tunnels were built for military purposes. Every great castle had its underground passage for escape.

Canal construction in France and England in the latter half of the 17th century stimulated tunnel building, but it was not until after 1800 that tunneling through sand and wet ground was extensively undertaken. The greatest stimulus to tunnel building came with the railroad era.

THE WORLD'S MOST FAMOUS TUNNELS

THE Mont Cenis tunnel through the Alps, nearly 8 miles long, was the first to link Italy and France. The work took from 1857 to 1870, and cost \$15,000,000. It was bored simultaneously from both ends, so accurately that the two bores joined at the center practically without error.

The St. Gotthard tunnel in the Alps, 9½ miles long, took from 1872 to 1881 to build, and cost \$11,500,000. To gain gentle grades, the approach lines dive into mountains and spiral around inside, four times at the south, three times at the north.

The Simplon, also in the Alps, 12½ miles long, is the longest railway tunnel in the world. Built between 1898 and 1905, it cost nearly \$16,000,000.

The longest double-track tunnel, 9.1 miles, pierces the Apennines between Florence and Bologna. Started in 1913, it was opened in 1934. The cost of the tunnel itself was about \$40,000,000.

The pneumatic shield was first used (1825-43) for a footsubway under the Thames at London.

The longest tunnel in North America is the Cascade, 7.8 miles, through the Cascade Mountains 100 miles east of Seattle. It was completed in three years (1926-29) by first running a pioneer bore at one side of the main tunnel and making cross-cuts to the route of the latter, so that crews could work at several points simultaneously. The Moffat tunnel (1927) under the crest of the Continental Divide near Denver is 6.1 miles long. The Gunnison, in southwestern Colorado, is 6 miles. The Rogers Pass, in British Columbia, is 5 miles. The Hoosac, in Massachusetts (1855-76) is 4½ miles, and cost in all about \$20,000,000.

The longest under-water vehicular tunnel, opened in 1934, connects Liverpool, England, with Birkenhead. It is more than 2 miles long.

New York surpasses all other cities in mileage of tunnels and subways (see New York City).

TUNNY. If an artist were asked to paint a picture of an ideal fish, for beauty, strength, and speed, the picture would probably resemble closely the great leaping tunny, the king of all ocean game. This fish, also called the "tuna," the "giant mackerel," and the "giant albacore," is the largest member of the mackerel family; and it has a record length of more than ten feet and a weight of 1,500 pounds.

From his sharp nose to the slender base of his tail, the tunny swells out and tapers again in almost perfect curves. His body, indeed, has provided a natural model for the builders of the fastest racing yachts. Driven by his powerful tail fins, he flashes through the waves with the speed of an arrow, frequently hurling himself out of the water and seizing the swift flying-fish.

Tuna fishing is the most exciting sport of the Pacific coast. Amateur fishermen put out to sea, in powerful launches, with trolling lines baited with a big flying-fish, the favorite food of the tuna. "Suddenly the fish strikes like a living meteor," says a well-known writer on game fishes. "A mass of white foam leaps upward. There is a blaze of silver, then loud musical notes, z-c-c-c, z-c-c-c, rise on the air as the big reel gives tongue, and the fight is on. The tuna turns and rushes

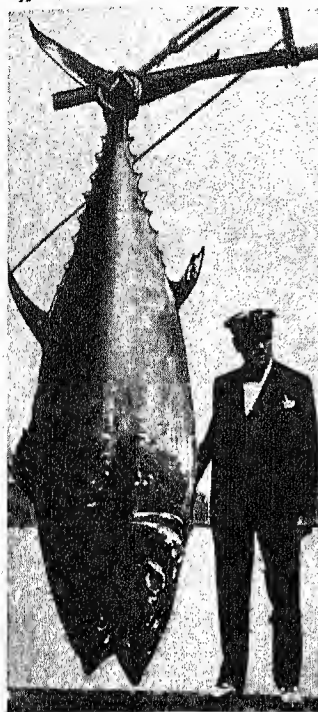
seaward, tearing at the line—taking feet—yards—and has 500 feet of line perhaps before the boatman has his boat under sternway; and then begins the contest, ranging, according to individuals, from 10 minutes to 14 hours."

Fishing boats are often towed 12 or 15 miles by a tuna weighing no more than 150 pounds. On the Atlantic coast, where these fish grow even larger than in the Pacific, they are sometimes caught with hand lines, without reel or rod. On more than one occasion fishermen who became entangled in these lines have been jerked overboard and drowned.

The European tunnies are caught in nets shaped like a funnel, the fish entering the wide end and being driven to the narrow end, where they are killed with lances and harpoons. Near Constantinople tunnies appear in shoals so crowded that they are often taken by hand. Tunnies preserved in oil are preferred in southern Europe, and this industry has become highly important in the Mediterranean.

The chief commercial fisheries of North America are in the Pacific off the coasts of California, Mexico, and Panama; and most of the canning plants are in

A RECORD BREAKER



This giant tunny, caught with hook and line off Liverpool, Nova Scotia, weighed 956 pounds.

California. Of the various tunas and tunalike fishes caught for canning, the yellowfin is the most important. Others of commercial value from the Pacific are the skipjack, or striped tuna, the bluefin, the bonito, and the albacore. Less important is the commercial tunafishing along the Atlantic seaboard, although it yields the biggest of tuna—the horse mackerel. These may be caught in specially constructed trap-nets.

Barbless hook, line, and pole are used to catch the yellowfin. When waters promise great schools of tuna, the fishermen stand ready on platforms that extend

from the side of the boat. From the bait tanks aboard, sardines ("chum") are strewn on the water. Up surge the ravenous tuna, sometimes by thousands.

From short poles the fishermen dangle feathered lures concealing hooks. Some of the tuna seize these instead of the chum. Before they can shake loose from the barbless hooks, they are flipped aboard by a swing of the pole. When yellowfins run 50 to 75 pounds each, three poles may be attached to one hook to give more manpower per fish. The fishing crews work on a percentage basis, and to hold his own, a man needs a quick eye, a swift hand, and spring-steel muscles. The boats stay out on the fishing grounds, working day and night, until the tanks are filled. To keep the tuna in prime condition until the catch is brought in to the canneries, mechanical refrigeration is used on some boats.

Scientific name of European tunny, *Thunnus thynnus*; bluefin, by some scientists called *Thunnus thynnus*; and by others, *Thunnus saliens*; horse mackerel, *Thunnus secundodorsalis*; yellowfin, *Neothunnus macropterus* or *catalinae*.

TUPPER, SIR CHARLES (1821–1915). This Canadian statesman was one of the handful of men, called "Fathers of Confederation," who in 1867 united the separate provinces of British North America into the Dominion of Canada.

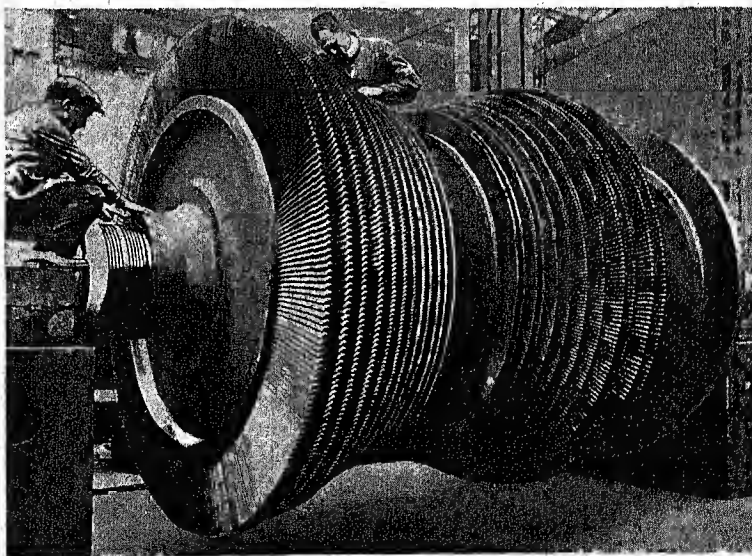
Charles Tupper was born at Amherst, Nova Scotia, on July 2, 1821, the son of the Rev. Charles Tupper, and the grandson of Eliakim Tupper, who came to Nova Scotia from Connecticut in 1763. He received degrees in medicine and surgery at Edinburgh University in 1843. For 12 years he practised medicine in his native town and toiled through snowdrifts and mud to the side of his patients. The same courage and determination thrust him ahead in his political life, which began in 1855 when he was elected as a Conservative to the Nova Scotia assembly.

He did his great work from 1864 to 1867 as premier of Nova Scotia. Largely through his relentless efforts, Nova Scotia was brought into the union of 1867 against the fierce opposition of Joseph Howe and his anti-Confederation forces. Tupper also was a leader in preventing repeal of the union. He was created a knight (1879) and a baronet (1888).

In the Dominion government, he held many high offices. As minister of railways and canals, he supervised arrangements for building the Canadian Pacific Railway. In 1896, he became premier of the Dominion for a few months. He retired to private life in 1900. The last of the Fathers of Confederation, he died in England, Oct. 30, 1915.

TURBINE. Perhaps you have seen city firemen dragging their hose to a burning building. It is filled with water almost to the bursting point, but the

THE MOVING PART OF A GIANT SHIP'S TURBINE



This is the "rotor" of one of the *Queen Mary's* turbines. It is enclosed in a stationary casing or "stator," with blades (also called "vaness" or "buckets") which fit between the blades you see on the stator. The stator blades are cupped in the opposite direction. The steam enters in the middle and passes between the rotor and stator blades toward both ends. As the steam pushes against a rotor blade, the curve of the blade directs the flow back against a stator blade, which curves it against a rotor blade in the next tier, and so on. The blades increase in size toward the ends to offset the steam's expansion.

nozzle is turned off. One man can hold it easily. But as soon as the nozzle is opened and the big stream starts to spurt, the hose straightens and jumps like a giant snake. Two or three men have all they can do to keep its nose turned upon the blaze.

That sudden power, which comes from the release of a fluid under pressure, is the same kind of power which is used in turbine engines, whether they be water turbines, steam turbines, or air turbines (see Windmills). It depends upon the momentum attained by the water or the steam. Now if you wished to use the power developed by the firemen's hose, there are evidently two ways of doing it. You could set up a wheel with vanes or wings on its rim, and direct the full force of the water as it came out of the narrow nozzle against these vanes, and the wheel would spin at great speed.

This would be an example of the simplest form of turbine, called the "velocity" or "impulse" turbine.

On the other hand, imagine a number of wheels *inside* the hose, all of them attached to a suitable shaft, and arranged so that the flowing water would strike them, one after the other, before it reached the nozzle. The stream through the hose would be slowed down, of course, and these wheels would not turn so fast as the one described above, which receives all at once the full force of the stream, but they would deliver a steadier and equally powerful motion. This would be an example of the "pressure" or "reaction" turbine.

There are, of course, many ways of applying these two fundamental systems, but the accompanying pictures show the essential parts of the simpler forms of water and steam turbine engines. Steam under ordinary boiler pressure has one great advantage over water—it expands in volume with tremendous velocity, often as much as 4,000 feet per second. No wheel made can revolve at anywhere near this speed, but various devices are used to "tame down" the steam, such as distributing the flow through several turbine wheels in succession. The Curtis type of steam turbine uses the "impulse" system, while the Parsons type is built on the "reaction" plan.

Water turbines are of immense value where a swift and plentiful supply of water is available. They are used for generating electricity, in pumping water for irrigation, etc. Some of the largest hydroelectric plants in the world are situated at Niagara Falls, where the vast flow is harnessed to more than a score of mammoth turbines. In the high Sierra Mountains

in California where streams of water can be dammed so as to get high water pressures, impact turbines are favored. Where the volume of water is great but pressure is low, as at Keokuk on the Mississippi, "pressure" or "reaction" turbines are used.

To be efficient, steam turbines must run at high speed. This causes difficulty in using turbines on ships, since the propellers cannot run at turbine speed. Some ships meet the difficulty with "reducing gears" between the turbines and the propellers. Separate turbines are provided to back the ship, for turbines cannot be reversed. In "electric drive" ships, the turbines run electric generators, which can operate at turbine speed. The current from the generators is used in motors to drive the propellers.

TURGENIEF (*tur-jen'yef*), IVAN (1818-1883). It was through Ivan Turgenieff that the Western world first be-

came acquainted with Russian literature. He ranks as one of the great novelists of the world.

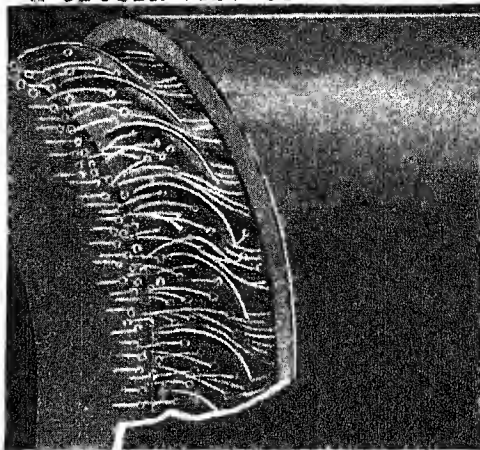
He was born in central Russia, into an old noble and wealthy family that had long been established on generous estates. Private tutors taught the young lad French, German, and English, for aristocratic Russians at that time considered it beneath them to speak the language of their own country. That knowledge of Russian which he used with such mastery in his books he was compelled to pick up from the servants. Later he studied at the universities of Moscow, St. Petersburg, and Berlin. His mother wanted him to follow a government career, but the young man had determined to devote himself to literature.

Because of the liberal ideas he had expressed in his writings Turgenieff was exiled to his country estate for two years. At the end of his exile he left Russia never to return except as a visitor. His active life he spent in Paris, where he wrote the greater number of his novels.

On his parent's estate he saw many examples of the ill-treatment of the serfs, which he later described in his first book, 'A Sportsman's Sketches'. This book helped to stir Russian society to a consciousness of the evils of that system, and was of some influence in hastening the emancipation of the serfs in 1861. By many this book is considered to be Turgenieff's masterpiece. It is full of delicate delineation of character and exquisite nature descriptions.

Turgenieff's most famous novel, 'Fathers and Sons', aroused bitter controversy and caused sharp attacks against the author. The novel deals with the con-

A CLOSER VIEW OF THE VANES



This picture shows how the particles of steam (represented by the little "tailed" circles), after striking the first ring of vanes on the shaft drum, are then deflected by the vanes on the inside of the cylinder so as to strike directly upon the next ring of vanes on the drum, and so on. Thus the countless small "pushes" in rapid succession set the shaft whirling at enormous speed.

flit between the fathers, who represent the Conservative party and believe in the rights of the nobility, and the children, who represent the Liberal party with its revolutionary ideas. The hero, a young doctor, is a "nihilist," a term which first found expression in this novel. As here described a nihilist is "a man who bows before no authority and accepts no principle unproved." He takes a negative attitude toward all institutions and throws overboard all conventions. The Liberals were furious at this representative of their party, whom they considered a caricature. The Conservatives were even more angry at what they considered a portrayal of the weakness of their party.

In all of his novels Turgenev pictures the state of Russian society, especially the Russian gentry and the various intellectual types of the period. He is both realist and idealist. His style is delicate and charming. A wistful tenderness tinged with melancholy pervades his novels and produces the effect of strange sad music.

In Paris Turgenev mingled with the great men of the period, by whom he was loved and respected. His works were translated into French and English soon after their publication, and received favorable criticism. Turgenev never married. When he died in 1883, his body was taken from Paris to Russia, the country from which he had lived for so many years a voluntary exile.

Turgenev's chief works are (under their English titles): 'A Sportsman's Sketches' (1850); 'Diary of a Superfluous Man' (1850); 'Rudin' (1855); 'A Nobleman's Nest' (1858); 'On the Eve' (1860); 'First Love' (1860); 'Fathers and Sons' (1862); 'Smoke' (1867); 'King Lear of the Steppes' (1870); 'Spring Waters' (1872); 'Virgin Soil' (1877).

TURIN (*tū-rin*'), ITALY. With its broad straight streets, its beautiful buildings, its fine summer climate, and its magnificent view of the Alps, Turin is today one of the most attractive cities in Italy. It is built at the junction of the river Po and the Dora Riparia, upon the site of the ancient Roman town of Augusta Taurinorum.

From its position near the French border, directly opposite the Mt. Cenis Pass and the Mt. Cenis tunnel, Turin has gained great commercial importance. It is the fifth largest city in Italy, and is the center of the Italian automobile industry, employing more than 5,000 men in this work alone.

Since the earliest days, when the Romans took the city from the Taurini Gauls, Turin has been of great strategic importance. Realizing this, the Romans built a 21-foot wall around it, portions of which still remain. When Hannibal came over the Alps in 218 B.C. it was one of the first towns he captured.

Turin, as capital of the principality of Piedmont and later of the kingdom of Sardinia, is the nucleus around which grew the present Italian kingdom. It was the capital of united Italy from the time of the union in 1860 until 1865.

Turin has a university founded in 1400, which is celebrated today for its medical and scientific depart-

ments. The museums of the city contain many interesting relics of the early history of the region, and its art galleries have important works by Van Dyck and sketches by Raphael, Michelangelo, and Leonardo da Vinci. Turin is noted for the large number of public monuments which grace its squares.

Besides automobiles, Turin manufactures rayon, machinery, cotton, silk, leather, and chemicals. The power for its industrial plants is mostly derived from electricity generated by the near-by mountain torrents. Population, about 600,000.

TURKESTAN. In the heart of Asia, between the Caspian Sea on the west and the Desert of Gobi on the east, north of Persia, Afghanistan, and Tibet, lies a vast region some 2,000 miles in length which has undergone strange vicissitudes. Successive peoples and civilizations here arose and flourished on what was once a fertile soil, but today their cities lie buried under the drifting sands which slowly but irresistibly have ruined the land. Life itself is gasping under inevitable doom; all the water of this country comes from the snow and ice of the mountains, and both natural and historical records show a slow drying up of the country which has advanced perceptibly in the last century.

We call this region "Turkestan," a name originally meant to apply to all territory inhabited by Turks. But today Turkestan has neither racial, geographical, nor political unity. It no longer includes Turkey, and the region it does include contains a picturesque mixture of Chinese, Russians, Turkomans, Kirghiz, Uzbeks, and a score of other races and peoples. It is a country of lofty mountains, desert plateaus, and desert lowlands, with some grassy steppes and still fertile river basins, sharply divided into an eastern and a western part by the lofty Tien Shan Mountains. It lies in central Asia between Siberia on the north; Tibet, India, and Afghanistan on the south; the Caspian Sea on the west; and Mongolia and the Gobi Desert on the east. There are a Chinese Turkestan, a Russian Turkestan, and an Afghan Turkestan.

Knowledge of Turkestan's early history is very dim, but East Turkestan has long been under Chinese domination, in spite of occasional violent invasions by Mohammedans and by Mongols. During the 19th century the followers of Islam many times sought to throw off Chinese rule, but East Turkestan has been, since 1877, securely Chinese and is today part of the province of Sinkiang.

The high plateau of Chinese Turkestan (sometimes called Kashgaria) is walled off on three sides by towering mountains, and on the fourth—the east—by the worn stumps of an ancient mountain chain. It is practically a bay of the great Gobi Desert, sprinkled with oases and sparsely watered by streams, most of which soon sink into the sand and are lost. Yarkand, Khotan, and Kashgar are among the most important cities of today.

Near the Kashgar and Yarkand rivers in Sinkiang, the fertile soil, when irrigated, produces crops of

cereals, cotton, fruits, and vegetables. Wool, silk, and gold are other products of this region.

Russian Turkestan, annexed by Russia about 1865, has the following political divisions: (1) Turkmenistan (Turkmen Soviet Socialist Republic); (2) Uzbekistan (Uzbek Soviet Socialist Republic); (3) Tajikistan (Tajik Soviet Socialist Republic); (4) parts of Kirghiz and Kazakh Soviet Socialist Republics.

Turkmenistan is noted for its fiery horses, fat sheep, astrakhan fur, and exquisite hand-woven rugs of wool. Cotton and fruit are raised on irrigated lands. Petroleum, sulphur, and salt are the important minerals. The country's area is 171,428 square miles; its population, about 1,255,000. More than 125,000 live in the capital, Ashkhabad.

Uzbekistan grows Russia's prize cotton. This crop extends over two million acres. The Turkestan-Siberian Railway, finished in 1930, brings wheat and timber from afar to feed and house the 6,285,000 people in Uzbekistan's 142,857 square miles. The people raise fruits, produce wool, leather, and silk, work deposits of petroleum, sulphur, and coal, and manufacture cement, textiles, and farm machinery. Tashkent, the capital (population, 585,000), is the center of commerce. Samarkand, the former capital, is one of the oldest of cities. Here molds the tomb of Timur Leng who revived the greatness of Samarkand centuries after its destruction by Alexander the Great. "Bukhara the Noble," an ancient center of learning, markets the Bukhara rugs prized throughout the world.

Tajikistan has vast mineral wealth in its small area of 55,598 square miles. Sulphur, petroleum, coal, lead, and mica are some of its chief resources. Mining, farming, road building, and herding occupy most of its 1,485,000 people. About 83,000 live in the capital, Stalinabad.

The Kirghiz Soviet Socialist Republic, which lies partly in old Turkestan, includes 76,062 square miles and has 1,460,000 people, chiefly herders. The capital, Frunze (population, 93,000), has many factories.

The Kazakh Soviet Socialist Republic, also lying partly in Turkestan, has 6,145,000 people in its 1,059,458 square miles. The people farm, fish, and mine. Industry centers in the capital, Alma-Ata (population, 230,000).

Russian Turkestan is being developed to supply the entire Soviet Union with all the cotton it needs. Long-staple cotton has been introduced to lessen dependence on the United States and Egypt for the finest grades. Canals built from the Amu Darya, the Syr Darya, and other rivers are transforming millions of desert acres into rich plantations. These irrigation projects are in-

creasing the cotton yield so greatly that Russia exports millions of pounds in fruitful years.

Afghan Turkestan is now the Mazar Province in the north of Afghanistan. It includes 57,000 square miles, and has an estimated population of 800,000. About 20,000 live in Mazar-i-Sharif, most important of the few towns in this mountainous land. The town trades in cotton and astrakhan. Freight is moved largely by camels, although a motor road links Mazar-i-Sharif with Kabul, capital of Afghanistan.

TURKEY. Thanksgiving and roast turkey are synonyms in the United States. From the Pilgrims' first Thanksgiving Day, when Indians brought wild turkeys for the feast, no Thanksgiving menu has been complete without its roast turkey.

The turkey is native only to America. It is related to the pheasant, the grouse, and the quail, but its bare head and neck and its squarish tail place it in a distinct family. The tail has from 14 to 18 blunt buff-tipped feathers. These the male, or cock, spreads fanwise and raises above his back in courting days. The dark plumage has metallic green, copper, and bronze reflections. A tuft of black hair, long and coarse in the male, hangs from the upper breast.

The call note, *turk, turk, turk*, doubtless gave the birds their name, as the cock's *gobble-gobble* has caused it to be called the "turkey gobbler." The turkey hen hides her nest from the cock, as he may break the eggs. In the wild state, the hen usually lays about 12 eggs a year and rears only one brood a year, unless misfortune overtakes her first brood.

Turkey raising requires special care of the young, or poults, for several weeks after they have been hatched. They must be kept dry and warm. Many die from being caught in the rain or from running in damp grass.

Wild turkeys were formerly plentiful in southern Ontario, in most of the United States, in Mexico, and in Central America. Now they are rare, but the domesticated turkey, the descendant of the wild, is common in poultry yards both in America and in Europe.

It was carried to Europe from the New World early in the 16th century. The American bronze turkey, which is the largest of our domestic birds, is from the stock of the Mexican

wild turkey; it attains a weight of 40 pounds or more. White, pied, and buff turkeys have also been bred with success. Our domestic varieties stem from sub-species of the common wild turkey, *Meleagris gallopavo*. The only other species, the Yucatan turkey (*Agriocharis ocellata*), has been little domesticated.

WILD TURKEYS



Many years ago, if you were a skilful hunter, you could find groups of wild turkeys like this in almost every part of the United States. Today you can find few, except in the South and Southwest. Many states are restocking their wooded areas with wild turkeys to provide game for hunters.

The LAND of the TURKS and Its CHECKERED HISTORY



Looking from the Galata Section of Istanbul across the Bosphorus

TURKEY. The ancestors of the "Osmanli" or Ottoman Turks (who got their name from their early leader Othman or Osman) were barbaric pagan herdsmen when they first wandered into western Asia in the 13th century, as the result of one of those internal commotions to which central Asia was periodically subject. They belong to the Ural-Altaic branch of the Mongolian race, and were related to the Tatars, Mongols, Finns, and Magyars. Embracing Mohammedanism with fanatical zeal, they were settled by the Seljukian sultan of Iconium in northwestern Asia Minor, as a reward for military services, and soon the whole of that peninsula was under their sway. In 1353 they seized Gallipoli, on the European side of the Dardanelles. A hundred years later they were in possession of Constantinople (now Istanbul) and most of the Balkan Peninsula. A century after that their armies were thundering at the gates of Vienna, in the very heart of Europe; while all Asia west of Persia, and Egypt and northern Africa almost as far as the Strait of Gibraltar, formed part of their vast and barbarous empire. The Turkish sultan had also assumed the califate, or spiritual leadership of the Mohammedan faith.

Decline of Turkish Power

Of that formidable Ottoman power, only a remnant now exists. Greece and other Balkan states made good their independence in the course of the 19th century. Algeria and Tunisia were lost to France, and Tripoli to Italy. Crete, Cyprus, and other Mediterranean islands are in the hands of foreign

"THE historie of the Turkes," wrote Richard Knolles in 1610 in his quaint old quarto volume, "is nothing else but the true record of the wofull ruines of the greater part of the Christian commonweale"; and he added that their empire was "of all others now upon earth farre the greatest." For several centuries, indeed, Christian civilization seemed to tremble in the balance before the advance of this conquering Mohammedan power. How that menace was brought to naught and the Turkish Empire transformed into a modern republic is sketched in this article.

powers. Turkish possessions in Europe, which before the Balkan Wars extended to the Adriatic Sea and covered an area of 65,370 square miles, were reduced by those conflicts and by the first World War to a triangle 30 miles by 40, immedi-

ately around Constantinople. The successful operations of Mustapha Kemal Pasha against the Greeks, and the unwillingness of war-worn Europe to fight in 1922, won back for Turkey part of Thrace, so that her European possessions now cover 9,257 square miles, and her total area is about 300,000 square miles. The population is more than 16,000,000.

The Home of the Turks

The peninsula of Asia Minor or Anatolia, to which Turkish rule is now practically confined, is a historic land, which has been from the earliest times a great center of migration and a battle-ground of warring nations. (see Asia Minor). Consisting for the most part of a high plateau sloping toward the sea on three sides, its surface is divided by mountains, which prevent an even distribution of moisture and which break up the country into many more or less isolated districts. In spite of backward agricultural methods the peasants on the Aegean side are able, aided by the fertile soil, warm sunshine, and abundant moisture, to produce an abundance for their needs of wheat, oats, and barley; as well as tobacco and cotton, grapes, olives, and figs for export. The coast of the Black Sea, exposed to northern winds and fogs, is much colder, and on account of the narrowness of the valleys there is comparatively little arable land;

but fertile soil and abundant summer rain make it the chief tobacco-growing region of Turkey. Wheat, barley, corn, and millet are other important crops. The southern coast has a typical Mediterranean climate with dry summers and rainy winters. The best farms of this coast lie in the Cilician Plain southeast of the Taurus Mountains. Cotton and wheat are the cash crops. Olives, mulberries, figs, lemons, and sugar cane also thrive.

The great plateau of the interior has little rain. Indeed, it is almost a desert because the mountains that rim it take the moisture from the winds before they reach the plateau. It grows little but drought-resistant grass and brush, which serve as food for millions of goats. Here is the original home of the Angora goats which yield mohair. Millions of sheep and cattle are also raised. The mountain slopes, receiving abundant rain, grow forests of pines, oaks, cedars, beeches, and other trees.

Two-thirds of the people live by farming. The average farm is too small to employ machinery. But the government is introducing machinery for large-scale production of tobacco and cotton, and is fostering other improvements. Deserts are being irrigated. Wasteful cutting of forests has been stopped.

Mining and Manufacturing

The government is also surveying and developing the mineral resources, many of which have been almost untouched. Coal, chrome, and borax are mined in commercial quantities. Other important minerals are emery, zinc, and copper. Much of the manufacturing is still in the handicraft stage, partly because so many of the people live far from roads and railways. Turkey is famous for its handmade textiles, notably carpets; but

in recent years, the government has financed the building of many factories, mills, and packing houses. These produce textiles, paper, glass, chemicals, cement,

sugar, fruit and animal products, lumber, and iron and steel.

The mule trains and oxcarts, which still carry much of the country's goods, are being replaced by motor trucks and freight cars. Railroads have been nationalized, and the government has pushed the building of both railroads and highways. It has also taken over and extended the telegraph, telephone, postal, and radio services.

A Land of Many Peoples

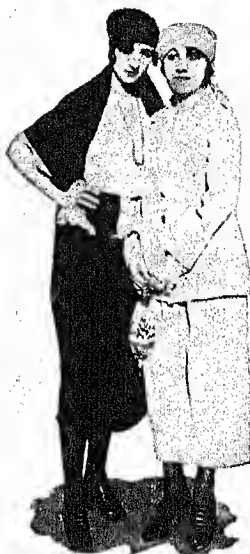
Anatolia contains a medley of many races and languages, which have never become welded into a unit. The ruling race is the Ottomans or *Osmanlis*, or, as we commonly call them, Turks. But besides these there are Kurds, Circassians, Gipsies, Armenians, Jews, Greeks, and many other peoples. The Turks themselves are a mixed people, due to their habit of polygamous marriage with female slaves or captives of every race. Modern Turkey has tried to assimilate these various peoples. Most of the Greeks were either sent home or were allowed to starve, and the Kurds have resisted, but with these exceptions, nationalization has made great strides since 1922.

The harmonious Turkish tongue is a Turanian language and has borrowed many words from the Arabic and Persian. Latin characters are now used in all official documents, replacing the beautiful but difficult Arabic characters. Since 1929 the publication of books and periodicals in the old Arabic alphabet

has been forbidden by law.

The new Turkey is dropping other outgrown institu-

EMANCIPATED



The days of the harem are over for Turkish women. They dress like their western sisters, except that many prefer to cover their heads with a light scarf, rather than wear a hat.

THESE WHIRLING DERVISHES OF TURKEY WHIRL NO MORE



Whirling round and round until they are exhausted is the chief religious ceremony of these dancing dervishes. In Turkey the government has closed their monasteries, but in other Moslem countries they still perform their strange rites.

tions. The califate, which had given sultans a shadowy but powerful leadership over all Islam, was abolished in 1924. The divorce of church and state became final when Mohammedanism ceased to be the state religion in 1928. As a Mohammedan state, the law of Turkey was based on the Koran and on traditional sayings and actions of Mohammed and his immediate successors—the *Sunna* of orthodox Mohammedans. But after the califate was abolished, a new civil code, based on the Swiss code, was adopted (1926) to replace the Koran. Thereafter the *Ulema*, the interpreters of Mohammedan law and religion, were no longer a privileged class. The Gregorian calendar replaced the Mohammedan—the

Under the new national constitution primary education is compulsory and free for native Turks. Coeducation is encouraged. The government supports training schools for mechanics, carpenters, foresters, and other

special groups. The national University of Stamboul, at Constantinople (Istanbul), includes a medical and a law school, and there is also a law school at the capital Ankara (or Angora). Notable among the many foreign schools is Robert College in Istanbul, established in 1863 by American philanthropists.

The "Liberator of Turkey"

religious orders were abolished and monasteries closed. A law of 1925, requiring every man to wear a hat instead of a fez, caused a revolution in some of the provinces, and was carried out only by force. The adoption of European customs and laws also removed the necessity for the "capitulations," the special treaties protecting foreigners resident in Turkey and granting them, among other rights, the privilege of trial before their own consuls instead of in the Turkish courts where justice was difficult to obtain.

Emancipation of Women

Women in the old Turkey had almost no rights. A wife could not even ride in the same carriage with her husband. A woman's home was her prison. Today women are being encouraged to discard the long black veil, and they have been given equal divorce rights with men. Polygamy is prohibited. Unveiled women and girls work with men and boys in schools and offices. Women are doctors, lawyers, and members of Parliament. They received the right to vote in municipal elections and hold municipal office in 1930; in 1931 their privileges were extended to voting in national elections, and to election to Parliament by 1934.

SNOW DRAPES HISTORIC SANTA SOPHIA



Snow in Istanbul is a very rare sight; even in mid-winter the temperature seldom drops below 40 degrees. These children, in their Western dress, might fit into any American scene, except for the background of the ancient church.

1923. Kemal was born in Saloniki in 1881, of middle-class parents. He attended military school, where a mathematics teacher who found him a rare student called him "Kemal," which in Arabic means "perfect." At school Kemal became a "Young Turk" and an agitator against the rule of Sultan Abdul-Hamid.

A RARE SIGHT NOW



Only a small percentage of the women of Turkey now wear veils when they appear in public.

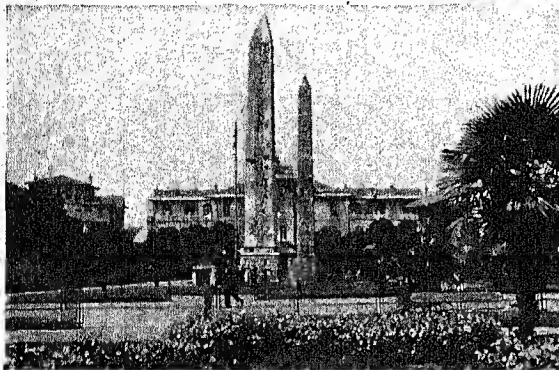
Though disapproving German influence and opposing Turkey's entry into the first World War, he fought brilliantly at Gallipoli, in the Caucasus, and at Palestine, and thus won the rank of "pasha." His title "ghazi" (the victorious) was added in 1921 when he defeated the Greeks in the decisive battle of Sakaria. He was already a national hero when he rallied his countrymen to save Turkey from partition under the Treaty of Sèvres, and dethroned the sultan in 1922.

Until he died in 1938, Kemal worked tirelessly to introduce modern methods of farming and manufacture among a people still plodding in the ways of 2,000 years ago. He rebuilt the old city of Ankara (Angora) into a modern capital of more than 100,000 people. He also made many improvements in Turkey's chief ports, Istanbul, Samsun, and Smyrna.

(Turkish *Izmir*). These ports clear incoming cotton and woolen goods, metals, machinery, sugar, and chemicals, and ship tobacco, fruits, vegetables, animal products, and cotton and are important trade centers as they have been for centuries. (See *Istanbul*; *Smyrna*.)

Rise of Turkish Power

It was under Orkhan (1326-59), the son and successor of Othman, that the Turks wrested from the Byzantine Empire (see *Byzantine Empire*) most of its Asiatic provinces and gained a foothold in Europe by the capture of Gallipoli. It was probably Orkhan also who started the practise of levying the tribute of bright, strong, Christian boys, 10 to 12 years old, and causing them to be reared as Mohammedans and trained under rigid military discipline for the famous military corps known as the Janizaries, or "new soldiers,"



The glittering tomb of Abdul-Hamid II, the "Great Assassin," is pictured at the top. The Egyptian obelisk of Thutmose III (below) marks the center of the famous Hippodrome, where the ancient Byzantines held chariot races, dethroned emperors, celebrated military triumphs, and watched Christians being put to death.

who later formed the backbone of the army. As the centuries passed, this force became so powerful and enjoyed so many privileges that leading Moslem families were eager to enlist their sons in its ranks. But in times of peace the Janizaries mutinied often and turned upon their masters, becoming a constant source of trouble to the sultans and their ministers. At last, in 1826, the whole force was massacred by the sultan Mahmud II (1808-39).

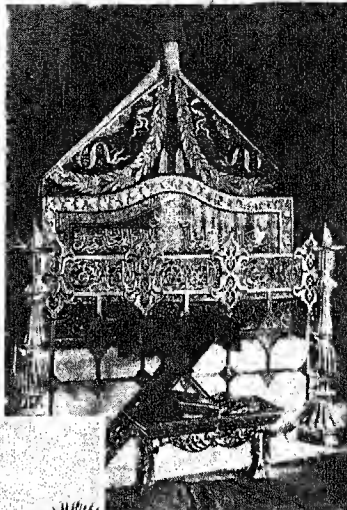
Under Orkhan's successors the empire grew steadily. Adrianople was captured in 1361. Vast Christian armies were overthrown in the Balkans at Kosovo (1389) and Nicopolis (1396); and even the defeat and capture at Ankara of Sultan Bajazet I in 1402 by the mighty Timur Leng (Tamerlane), the Mongol, administered only a temporary check. Bajazet's son, Mohammed I, recovered all the lands which the Mongols had overrun, and consolidated Turkish power in Asia Minor. Under his successors, Murad II and Mohammed II (the Conqueror),

the Turks extended their conquests in Europe, although they were held back by the heroic efforts of the "white knight," Janos Hunyady, Prince of Transylvania, and of Scanderbeg, the hero of Albania. Finally Constantinople fell in 1453 before the assaults of Mohammed II. Selim I the Grim (1512-20) took over the holy cities of Arabia—Mecca and Medina—and the title of calif, spiritual head of all the Moslems, in 1517; and transferred to Constantinople the symbols of the office, the standard and cloak of Mohammed.

Under Solyman the Magnificent (1520-66), greatest of the Ottoman sultans, Turkey attained the zenith of its power and glory. This "Grand Turk" crushed the forces of Hungary on the bloody field of Mohács (1526) and led his army to the gates of Vienna. Although Vienna was saved by its Austrian defenders, almost the whole of the kingdom of Hungary was converted into a Turkish province. From the Carpathian Mountains the Turkish power extended to the frontiers of Persia and around the Mediterranean to Morocco. The Black Sea was practically a Turkish lake, and Turkish corsairs reinforced by pirates of other nations ruled the Mediterranean. Solyman was lord over 50 million Moslems and Christians of some 20 races.

When the Turkish Empire was at its height, agriculture and trade prospered. New ideas and inventions were prized. Sultans rode at the head of well-fed armies, equipped with the most up-to-date weapons. They even had artillery employing gunpowder. Mosques, hospitals, and schools were built. The humblest slave might aspire to become grand vizier, chief adviser to the sultan and next to him in power, because there was no hereditary ruling class.

MARVELS OF ISTANBUL



GAILY PAINTED FERRY BOATS OF THE GOLDEN HORN



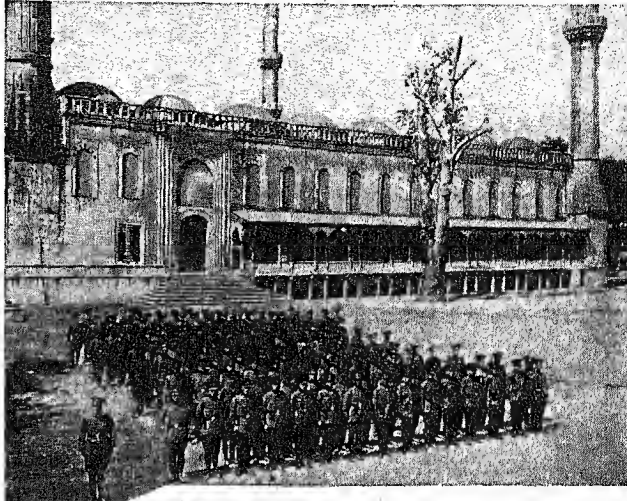
These boatmen dodge the ocean traffic in the great harbor of Istanbul and land you safely at Pera, the foreign quarter, or Galata, the business section, both of which can be seen in the distance.

But few sultans after Solyman the Magnificent were great warriors or statesmen. Most of them were harem idlers. Indeed, by the 17th century, heirs to the throne were secluded in "the cage" or seraglio, ignorant of the ways of government. The law of succession to the throne was peculiar in that the heir was not the sultan's oldest son, but the oldest male member of the imperial family. Because of this law many sultans caused the murder of their brothers or any other male relatives who might aspire to the throne. All children born in the sultan's harem were legitimate and equal in lineage. The inmates of the harem were chiefly wives and daughters of conquered enemies, and beautiful Circassian slaves. The chief wives were styled *kadin*, the others were known as *odalik* (odalisks).

Only five years after Solyman's death, the Turks met a serious defeat in the naval battle of Lepanto (1571), in the Gulf of Corinth, at the hands of Spain, Venice, and the papal forces. The decline of the Ottoman power soon began. There were weak and cruel rulers, and dissensions within the empire were added to disasters without. Then for a time there was a revival of power, and in 1683 the Turks made another formidable attempt to take Vienna; but after two terrible months King John Sobieski of Poland led an army of Polish knights to the relief of the city, and the great Turkish hosts were put to flight.

After that the Turkish power ebbed steadily, while the harem women, the Janizaries, and the Ulema fought for the power that the idling sultans were not strong enough to hold. State offices went to the highest bidders, who robbed the peasants of their meager savings by excessive taxes and thus brought on revolts. By 1718 Hungary was lost, and about 1783

MODERN TURKEY AND ITS FOUNDER



Russia, becoming a formidable rival, gained control of the Crimea and the regions north of the Black Sea. The 19th century saw the gradual redemption of the Christian provinces of the Balkan Peninsula from the fanatical tyranny and despotic cruelty of Turkish rule.

There was no force within the outworn Turkish Empire strong enough to hold together so many peoples of different race, language, and religion in the face of the rising power of Russia and Austria. Turkey was "the Sick Man of Europe," as Czar Nicholas I of Russia called it, and the only question was as to who should at last fall heir to Turkey's European territory. What should be done with these coveted lands—especially Constantinople—that formed the gateway to the East? This was "the Eastern Question." When Russia took matters into her own hands in the Crimean War of 1853-56, fear of Russian aggrandizement led England and France to aid Turkey and save the "Sick Man" from dissolution (see Crimea). Again, following the Russo-Turkish War of 1877-78, brought on by Turkish "atrocities" in Bulgaria, Great Britain and Austria intervened and demanded that the peace terms of San Stefano which Russia had dictated to Turkey, should be revised by a congress of the



Ghazi Mustapha Kemal Atatürk, first president of the Turkish republic, is pictured in the Western dress which he introduced into his country. Those little pet puppies show that Kemal broke the old Mohammedan tradition against having dogs in the house. Those smartly uniformed men at the top are Constantinople police, drilling before the celebrated mosque of Sultan Achmet. Modern Ankara (below), capital of Turkey since 1923, has grown up around an old fortified mountain town built on a rock.

Powers at Berlin (1878). The congress agreed that Bulgaria should be autonomous, and that Rumania, Serbia, and Montenegro should be independent principalities. Furthermore, they agreed that henceforth the Powers jointly should decide the status of Turkey.

Under Sultan Abdul-Hamid II (1876-1909), who left the government to unscrupulous officials, the

RURAL TURKEY CLINGS TO ITS ANCIENT WAYS



people suffered from heavy taxes and extortion. Telephones were forbidden; all printed matter was censored, and government spies were everywhere.

Then came the "Young Turk" revolution of 1908-09, under the leadership of European Turks educated abroad and organized into a far-reaching secret society. Having gained the support of the army, the Young Turks seized the government in July 1908 and proclaimed the restoration of the constitution which Abdul-Hamid had granted in 1876 and then disregarded. When, in 1909, the Sultan tried to suppress the revolt by force, they deposed him and placed on the throne his younger brother Mohammed V, who ruled until his death in 1918. He was succeeded by another brother, Mohammed VI, who was deposed in 1922.

But Turkey's difficulties were not over. Austria incorporated Bosnia-Herzegovina, and Bulgaria declared its independence. There were ill-advised attempts at enforced assimilation of the subject races; there were party quarrels and political assassinations. Then Italy attacked Tripoli in North Africa and conquered the last African possession of Turkey (1911-12). Only a few months after this disaster four Balkan countries allied themselves in a war (1912-13) which stripped Turkey of most of its European possessions (*see Balkan Peninsula*).

The Young Turks' alliance with Germany in the first World War completed the ruin of the empire, but Turkey rendered vast assistance to the Central Powers before it collapsed. Turkey cut off Russia from the Mediterranean by closing the Dardanelles in 1914. Turkish warships attacked Odessa in October of that year. Russia declared war on the Turks on November 3, and France and Great Britain did likewise on November 5. Failure of the Allies to combine their land and sea forces enabled Turkey to hold the Dardanelles against a strong attack in 1915; on April 25, Allied armies attempting to take Gallipoli were repulsed with the loss of 55,000 men. Not until 1917 did Turkey weaken before the Allied drive, chiefly British; the British overran Mesopotamia, took Palestine, and forced Turkey to sue for an armistice on October 31. (*See World War of 1914-1918.*)

By the Treaty of Sèvres, which was never ratified by the Turkish government, Turkey was to give up more than two-thirds of its territory of about 600,000 square miles. It was to lose all its lands in Europe except a small area around Constantinople, and nearly all in Asia outside Anatolia.



Houses and ways of living in rural Turkey have changed little in the last 2,000 years. In the upper picture we see a cluster of typical farm buildings, with a man drawing water. But in the lower picture the modern costumes of the children who are helping to turn figs in the drying frames show the trend of the times.

Turkish resentment flamed high at these terms, and a revolutionary (Nationalist) government was set up at Ankara under the leadership of Mustapha Kemal. In 1922, after Mustapha Kemal had routed the Greek armies in Asia Minor and retaken Smyrna, he captured Constantinople, later renamed Istanbul. The Nationalists deposed the Sultan and forced the Powers, by the Treaty of Lausanne, to allow them to reoccupy Eastern Thrace up to the boundary of 1914. In 1923 Turkey was proclaimed a republic, and in 1924 a highly democratic constitution was adopted. This vested all power,

both executive and legislative, in a Grand National Assembly. Each of the provinces, or *vilayets*, is governed by a *vahi* appointed by the minister of the interior. Kemal Atatürk, president 1923-1938, ruled as a virtual dictator by suppressing all opposition parties. The second president, elected by the Assembly in 1938, was Gen. Ismet Inonu, who had been premier for 13 years.

Turkey's strategic position athwart a major land route between Europe and Asia and its control of the Dardanelles, the gateway to the Black Sea, have given the country a key position in European diplomacy (see Dardanelles). During the second World War, Turkey was exposed to attack by both sides, and so from the outset held fast to a policy of armed neutrality. With weapons provided in part by Germany and in part by Great Britain, the Turks built up their armaments; then, as the power of the Axis waned, they gradually strengthened their ties with the United Nations.

TURNER, JOSEPH MALLORD WILLIAM (1775-1851). By the time he was six years old, this great English painter had convinced his father, a London barber, that he was "going to be an artist." At the age of 13 he was using his talent with a brush to earn money with which to pay for his lessons in art. In after years when pitted for this hard life, Turner said, "Well, and what could have been better practice?" From the dark skies and gray days of his boyhood may have come the great longing to picture "the light that never was on sea or land" which became the passion of his after-life. For always Turner painted light—light as he found it in the transparent air of noonday, in the afterglow of evening, in the passing cloud, or the reflecting water. These he painted and repainted until, at last, he was able to catch the very sunshine and put it on his canvas.

When yet in his 'teens he received a commission to make drawings for a magazine and in the next few years tramped over a good part of Wales and western England. Journeying on foot, his luggage at the end of a stick over his shoulder, his sketchbook under his arm, for days and weeks he lived with the earth and sea and sky, steeping his soul in their beauty. Later he tramped over northern England and Scotland, and frequently visited France and Italy, studying the historic and picturesque cathedrals and castles, rivers and harbors. His early sketches he made topographically exact, but in his later drawings he produced more the mental impression the scene had given him, and his picture became a poet's dream in color.

Turner was elected to membership in the British Royal Academy at the early age of 24, and from that time on his paintings were in great demand and brought good prices. He was not a success as professor of perspective in the Royal Academy, when appointed in 1808, but among the landscape artists of the time he was easily without a rival.

Turner's private life was eccentric. Except for his father, who lived with him for nearly 30 years, he had no intimate friends. Visitors were rarely admitted to the house where he lived, and no one was allowed to see him at work. He loved his paintings as a man loves his children. When induced to sell one, he would be dejected for days. He was especially fond of the one entitled 'Dido Building Carthage' and requested a friend to see that his body was wrapped in it for burial. The friend agreed but added, "I'll take pains to see that you are shortly dug up and unwrapped." This picture, with one of his other paintings, Turner willed to the National Gallery on the condition that they should always hang between two pictures of the famous French landscape painter, Claude, whose art Turner had always regarded as a challenge. Much evil has been said of his character, but those who knew him best found him



TURNER
England's Greatest Landscape Painter

gentle and considerate. Though sordid in his personal habits he was kind and generous to others.

When we hear Turner's name we always think of his famous oil paintings dealing with Venice or 'The Fighting Téméraire'. But as a water-color artist also Turner has never been excelled. His earliest success was won by his engraved plates of landscapes, many of them engraved by himself. This work was so much in advance of former landscape engraving that it might almost be reckoned a new development of art. On his death Turner's entire collection of paintings and drawings were willed to the nation and are in the National and the Tate galleries in London.

TURPENTINE. Crude turpentine resins or gums come from many varieties of trees, growing about the Mediterranean, and in the southern United States. The making of so-called "naval stores," turpentine, resin, tar, and pitch, is one of the oldest American industries, dating from colonial days, when these products were essential to shipbuilding.

The finest turpentine is made by distilling the clear colorless gum, chiefly of the southern long-leaf yellow pine. The gum exudes from cuts made in the bark, usually from April to October. If the sap-wood is not cut through, this does not seriously injure the tree. The gum is a pale, straw-colored, oily,

inflammable liquid. Turpentine is also obtained by distilling the wood itself. About 85 per cent of the supply goes into paints and varnishes, since turpentine absorbs oxygen and assists the action of the drying oils. It is used also in medicine; in making syn-

thetic camphor, dyes, inks, insecticides, and leather; and as a solvent for waxes, sulphur, phosphorus, resins, etc. The United States produces over 30 million gallons yearly. Oil of turpentine is the crude product freed of resin and refined by distillation.

The ARMORED CRUISERS of the REPTILE WORLD

TURTLE. High rents and moving days never bother the turtle. In his portable, self-enlarging, storm-proof house, he takes possession of any sunny beach or meadow that suits his fancy, or with only the trouble of arriving at the water's edge his shelter becomes a house-boat or a submarine whenever it suits his pleasure.

There are about 225 living species of this shell-protected, toothless, but legged order of reptiles. They range in size from the little mud turtle that the school-boy sometimes carries in his pocket to the great sea-roving leather-back turtle that measures from seven to eight feet in length and weighs as many hundred pounds. The curious house is formed by a bony growth, the upper part of which is covered with shields or plates of shell varying in shape and markings in the different species. The bony growth above the short broad body is joined to that below in such a way as to leave openings through which the head and legs can be drawn in under the shell except in the case of the water-dwelling turtles, who find their protection in their greater activity. In some species the tail is then wrapped around the body, covering the openings, and the house is thus protected like an armored tank from its enemies. But every hunter knows that he has only to turn the clumsy little tank upside down to convert it into a death trap, where his prey struggles in vain to right himself and when overcome with exertion can easily be carried away. The beak-like mouth has toothless jaws, which cut off mouthfuls of food, swallowed whole. Turtles have keen eyesight and seem to possess a very acute sense of hearing. When startled some give a loud snake-like hiss. They are not great travelers. Even the sea turtles return year after year to the same breeding beach. Marked terrapins and tortoises have been found season after season in the same location. They are long-lived creatures, some specimens having been known to reach an age of 250 years. The flesh



Like medieval knights, turtles fight in full suits of armor, each trying to find some exposed spot where he may get a grip on his foe. These two fierce warriors are Spotted Turtles.

of some varieties, especially the vegetable-eating turtle, is very good for food, while the eggs of most species are edible.

These eggs are buried in a sandy bank or beach where, using her

tail as a spade and her hind feet as a shovel, the female turtle digs a hole in which she then deposits her eggs, with their tough leathery shells, in some cases 250 or more in number. These are covered with soil which she pads down so naturally that the hiding place is discovered only by prodding the sand in places frequented by turtles. A rotten log serves some land varieties quite as well as soil for a nest. Some-

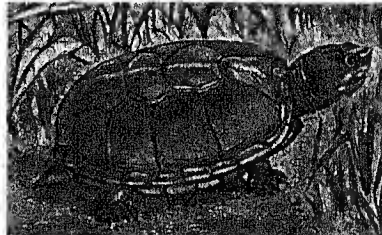
times several months in sun and sand are required to hatch the eggs. The young turtles are left to take care of themselves and so are easy prey for land crabs and birds.

The many species of turtle have quite different habits. Some live on land, some rarely leave the sea, and some divide the time between land and water. The land-living species are called "tortoises." They are generally a plain dull brownish color, feed largely on

vegetable matter, have short clawed feet, and are slow in their movements. Tortoises are found in most temperate and tropical regions. In the temperate zones they hibernate buried in earth or mud. The most conspicuous members of the tortoise group are the great tortoises found in certain ocean islands. These sometimes grow to a weight of 500 pounds and have shells that measure more than four feet in length. They are now almost extinct. Other interesting tortoises are the box and the gopher tortoise, both in the United States. The latter live in pairs in self-dug holes, the former has plates hinged on the belly-side so that the body can be completely inclosed when its head and legs are drawn into the shell.

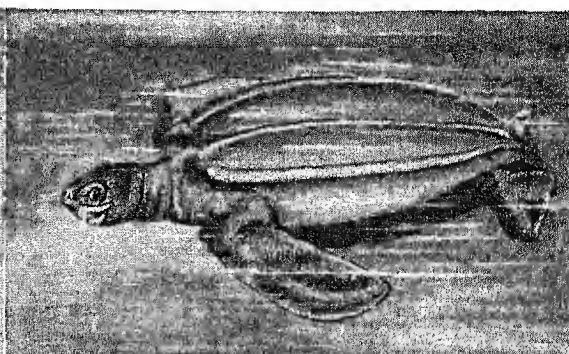
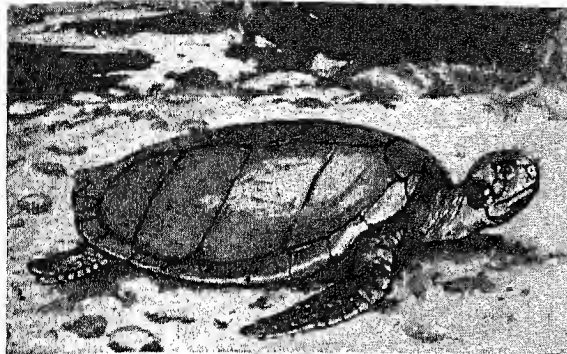
The turtles proper, that is the marine species, are the largest forms. Their flippers are paddle-shaped and adapted to swimming. The great leather-back is found in all tropical seas and has even been seen as

A HARD-SHELL AMERICAN



The Mud-Terrapins form an exclusively American family. The brown Pennsylvania Mud-Terrapin which roams over eastern North America from New York to the Gulf of Mexico is the best-known species.

"SHELLBACKS" OF SEA AND LAND



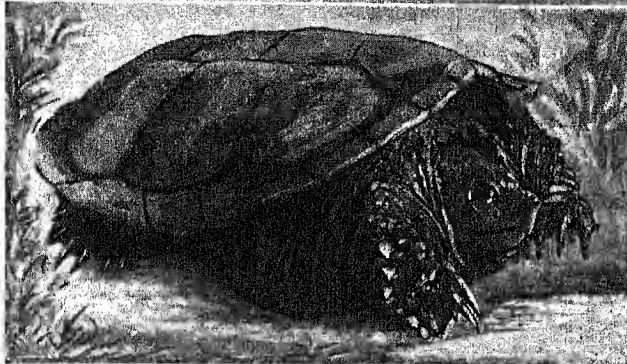
far north as the coast of Long Island or Great Britain. Its shield is a leatherlike case something like the covering of the crocodile. It has great swimming power so that a dozen men can hardly drag a hooked specimen up on the beach. The flesh is strong and little used for food.

The green turtle, which sometimes weighs 1,000 pounds, furnishes the favorite

turtle meat. It is found in various parts of the world including the West Indies, from which it is exported to Great Britain and the United States, where it is considered a delicacy. Sometimes the natives take

this turtle by a very extraordinary method of fishery. They tie long strings to the tail of the echeneis, a fish of the mackerel family, and toss him overboard in a spot frequented by grazing turtles. The fish dashes at a turtle seeking shelter and attaches itself to the turtle's shell by a large sucking apparatus on the top of its head and neck. Thereupon the fishers gently coax the turtle up toward the surface by pulling on the string, or follow it into shallow water where it is easily traced by the string and captured.

The hawksbill turtle is the most valuable member of the group. The shields from its bony shell, when polished, are a beautiful mottled brown, and almost

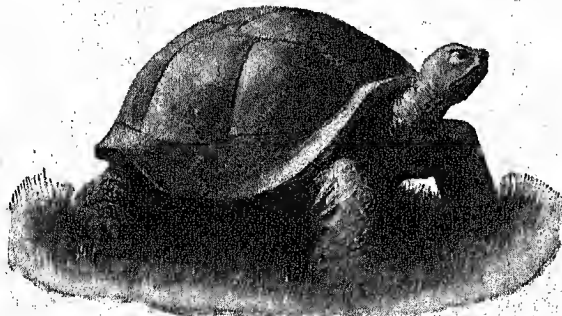


On the left, above, the green turtle, source of turtle soup, ventures ashore to deposit its eggs. On the right, the huge leatherback, whose jacket is leathery and ridged with seven keels, swims solemnly along in search of cuttlefish. The snapping turtle, below, member of a strictly American family, is unable to withdraw into its small shell, but its enormous head and strong jaws are protection enough.

transparent. This is the highly prized tortoise shell of commerce. The hawksbill inhabits all tropical and subtropical seas. The finest tortoise shell is obtained in the East Indies, though the West Indies produce large quantities. The hawksbill (also called *hawksbill*) takes its name from its long hooked beak. It is the smallest of the sea turtles, with a length of about 32 inches. The

largest is the loggerhead, which gets its name from its large head. It is found much farther north than the hawksbill. Its flesh is far inferior to that of the green turtle, but its eggs are delicious.

HE SAW NAPOLEON



When Napoleon's empire crumbled and the emperor was taken to St. Helena, this giant tortoise already lived on the island. He was still crawling about the island walks when the first Napoleon died; he was still crawling in his ancient way when Napoleon III rose and fell; he was still there when the first World War began and ended.

The name "terrapin" is rather loosely applied in the United States to a number of edible turtles of fresh or brackish waters and of salt marshes. A great many of the larger terrapins inhabit the waters of the southeastern United States. The diamondback terrapin of

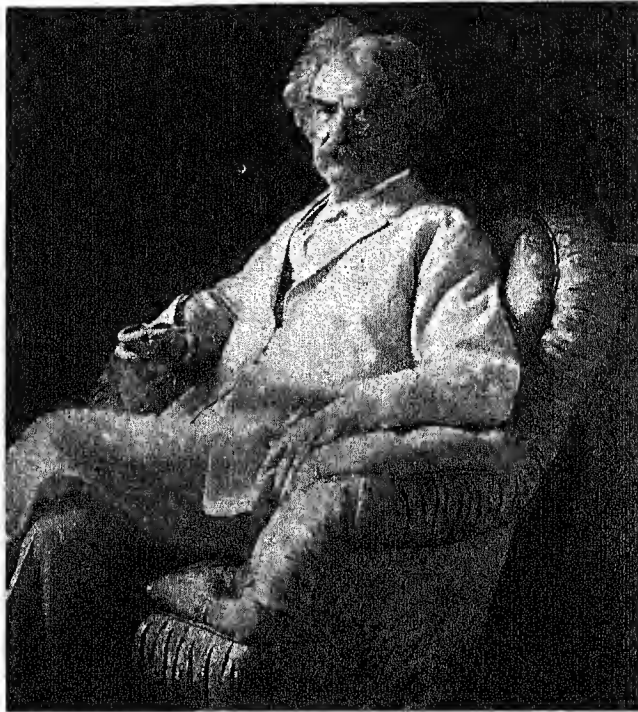
The mud turtles are an interesting group of American turtles that live in fresh water and are often seen on land. Some of them have two hinged and movable portions on the lower shell, as do box turtles. One of the group is the musk turtle, also called the "skunk turtle" or "stink pot" because of its strong musky odor. It has a narrow and poorly developed undershell which does not cover the soft parts.

the salt marshes along the Atlantic Coast is in such demand as a table delicacy that it is raised in inclosures for market. Other cheaper species are sold in great numbers as "slider terrapins." The little painted terrapin is a pretty tortoise of the eastern United States. Both the smooth olive green upper shell and the soft parts are gaily marked with red, yellow, and black. The under-shell is bright yellow.

The snapping turtles are ferocious fellows with enormous heads, powerful jaws, and long alligator-like tails. They have vicious dispositions and protect themselves by biting. These turtles reach a length of three feet from nose to tip of tail. They live in fresh water. The common snapping turtle is found throughout eastern Canada, United States, and Central America. The alligator snapper is a different species, found in the Mississippi-Missouri basin.

In addition to these well-known members, the turtle order contains many kinds that are peculiar to certain regions. The Galapagos Islands get their name from *galápagos*, the Spanish word for tortoise, because of a large land tortoise, now restricted to those islands and the islands of the western Indian Ocean. The matamata of Guiana and northern Brazil is a representative of the "side-necked tortoises," that bend the neck sideways instead of drawing it back under the shell. The matamata is remarkable for the fringes of skin along its flat broad neck. These fringes, floating on the water, may serve to lure small animals within the matamata's reach.

Turtles are cold-blooded vertebrates of the order *Chelonina* (from the Greek *chelonium*, a shield). They breathe through lungs during their entire life and not through gills during part of the time; as do frogs and toads. They are, therefore, true reptiles, though they can stay under water an hour or more. The upper shell, or carapace, is made up of plates, some of which are fused with the vertebrae and others with the ribs. The lower shell, the plastron, is formed by clavicles and abdominal bones. Land species have club-shaped limbs, with fingers and toes all bound together and distinguishable only by the claws. Fresh-water turtles have the digits distinct, but connected by a web. In sea turtles the limbs are paddle-shaped flippers. The leatherback turtle, unlike all others, has the vertebrae and ribs free from the carapace. It is placed in a separate sub-order, the *Athecae*, while all other turtles are grouped as *Thecophora*.



MARK TWAIN

TWAIN, MARK (SAMUEL LANGHORNE CLEMENS) (1835-1910). When Mark Twain was a boy he lived in the little river town of Hannibal, Mo. This was in the romantic days of steamboating on the Mississippi River, and the boys of the town grew up with the sounds of the busy river life always in their ears. As the steamboats puffed along the river channel, a leadsmen in the bows kept heaving the line and calling out

the depth. When his line sank to the two-fathom knot he would call, "By the mark, twain!" This meant that the boat was safe, with 12 feet of water under her, and so it was a pleasant thing to hear. When Mark Twain became a writer he took this familiar old river term for his pen name.

America's greatest humorist was born in the small inland town of Florida, Mo., but his parents soon moved to the lively river port of Hannibal. There he grew up, got the rudiments of an education in an ungraded school, learned the printer's trade, and later became a river pilot. Really he was still going to school, for the

river highway, which then swarmed with travel and trade, was the great university of life in the West. He saw so many interesting things and people on his voyages that when he began to write within a few years he at once made his pen name famous, though his real name was for long unknown to many of his admirers.

When the Civil War interrupted steamboating on the Mississippi, Samuel Clemens accompanied his brother, who was appointed secretary of Nevada Territory. He made his living in mining camps of Nevada and in California as a reporter and editor. The first story of his that attracted attention in the East was 'The Celebrated Jumping Frog of Calaveras County'. In 1866 he went on a trip to the Sandwich Islands, and soon after started his long and successful career as a lecturer and popular entertainer. As the result of a trip to the Mediterranean, Egypt, and Palestine, he wrote 'Innocents Abroad' (1869), a book which won for him a world-wide reputation.

Mark Twain's humor was recognized at once as being characteristically American, for it is clean, good-natured, shrewd, and independent in opinion. It is often exaggerated to the point of burlesque, but it is

never low or vulgar; and there is no sting in his wit, for the joke is always on some sham or hypocrisy, and usually has a shrewd lesson in it. He makes pretense and snobbishness look so foolish that he sets the world to laughing at them, and then to thinking seriously.

As lecturer, story teller, and humorous writer Mark Twain had no rival. But he was not content with the rôle of jester and entertainer. He studied history and biography and heroic legend, and won new laurels with his beautiful idyll, 'The Prince and the Pauper'; with his satire on the romances of chivalry, 'A Connecticut Yankee at King Arthur's Court'; and with his historical novel dealing with Joan of Arc. Out of the heart of his own boyhood, he drew his boys' classics 'Tom Sawyer' and its sequel 'Huckleberry Finn'. In doing this he also preserved a dramatic phase of life on the Mississippi that has now almost completely passed away.

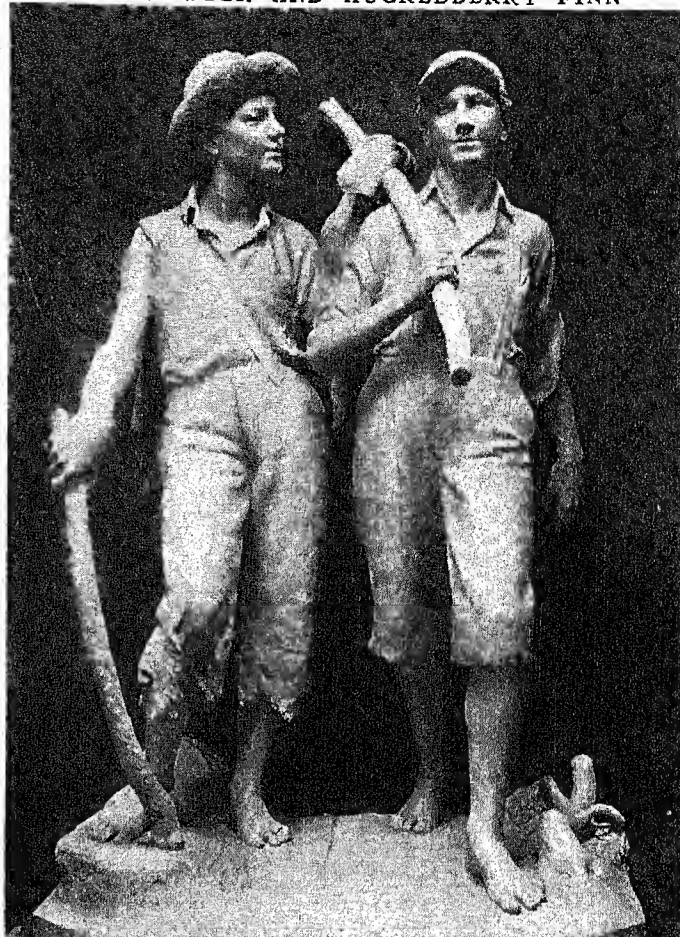
For many years Mark Twain made his home in Hartford, Conn. In 1895 the failure of a New York publishing house in which he had invested his fortune left him penniless, with huge debts, but he paid them off by a lecturing tour, in 1895-96.

His chief works are: 'The Celebrated Jumping Frog of Calaveras County' (1867); 'The Innocents Abroad' (1869); 'Roughing It' (1873); 'The Gilded Age'—with Charles Dudley Warner (1873), dramatized as 'Colonel Sellers'; 'The Adventures of Tom Sawyer' (1876); 'A Tramp Abroad' (1880); 'The Prince and the Pauper' (1882); 'Life on the Mississippi' (1883); 'The Adventures of Huckleberry Finn' (1885); 'A Connecticut Yankee at King Arthur's Court' (1889); 'Adam's Diary' (1894); 'The Tragedy of Pudd'nhead Wilson' (1894); 'Personal Recollections of Joan of Arc' (1896); 'Following the Equator' (1897); 'Captain Stormfield's Visit to Heaven' (1909).

Printed posthumously were: 'The Mysterious Stranger' (1916); 'What Is Man? and Other Essays' (1917); 'Autobiography' (1924); 'Mark Twain's Notebook' (1935).

TWILIGHT. When the sun sinks below the horizon in the evening we are not plunged immediately into darkness. So, too, in the morning there is light for

TOM SAWYER AND HUCKLEBERRY FINN

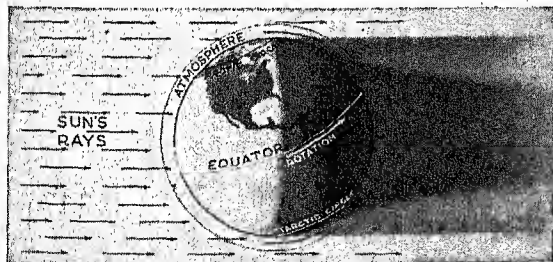


At the foot of Cardiff Hill in Hannibal, Mo., where Tom Sawyer and Huckleberry Finn used to meet, stands this fine bronze statue. It is just a block from Mark Twain's old home, now restored. The sculptor is Frederick C. Hibbard.

some time before the sun is visible. The period of fading light after sunset we call twilight, while the period of growing light before sunrise we speak of as dawn. Dawn, however, is also a twilight period.

Twilight, we might say, is nature's system of indirect lighting, for it is caused not by the direct rays of the sun shining on the earth, but by rays that are scattered and reflected downwards by the particles of dust and moisture in the atmosphere that is still in sunlight. Hence, if there were no atmosphere we should have no twilight.

The entire period of twilight—that is, the time between sunset and complete darkness, and between darkness and sunrise—is called *astronomical twilight*. The shorter period after sunset and before sunrise when it is light enough for outdoor occupations is known as *civil twilight*. On a clear evening, civil twilight begins when the center of the sun is about 6 degrees below the horizon. Astronomical twilight ends when the center of the sun is about 18 degrees below the horizon, since the atmosphere reflects



The lightly shaded portion of the earth in this sketch is the "twilight zone." It is shown larger than reality, and the height of the atmosphere is also exaggerated. Notice the curved arrows, which show how the sun's rays are reflected toward the earth by the atmosphere. The time is the summer solstice.

light an average distance of 18 degrees of a circle.

Twilight is shortest at the Equator, where it varies only about five minutes during the entire year—from one hour and 9 minutes to one hour and 14 minutes. As you travel north from the Equator, twilight grows longer. North of 50 degrees, during June and most of July, the sun is never far enough below the horizon to leave the earth in complete darkness. If you reached 50 degrees north on December 1 you would find only one hour and 57 minutes of twilight, whereas

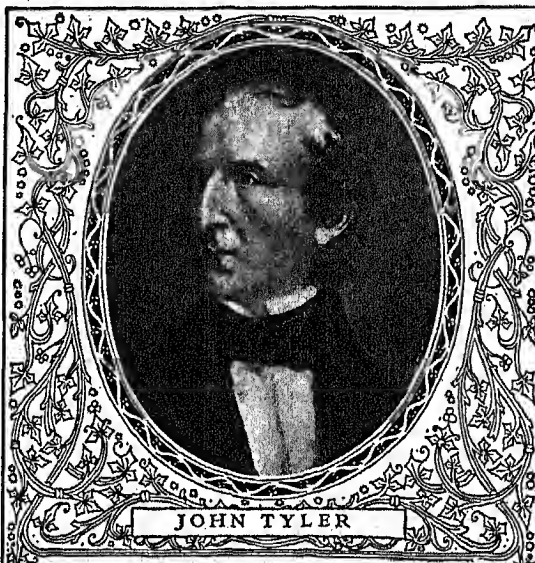
at 50 degrees south latitude twilight lasts all night. Summer twilight lasts longer in high latitudes because here the apparent path of the sun is oblique to the horizon. Rising north of east, the sun swings around slantingly through the sky and sets north of west. On this oblique path the sun takes longer to pass through the twilight zone—that is, to sink more than 18 degrees below the horizon—than it does when its apparent path forms a right angle to the horizon, as it does at the Equator.

"HONEST JOHN'S" Stormy ADMINISTRATION

TYLER, JOHN (1790–1862). "Honest John Tyler" regarded himself as one of the "Virginia presidents" and predicted that he would be the last one of the line. He was indeed the last president, up to the present time, who was born and bred in the "Old Dominion," but he hardly belongs in the same classification with Washington, Jefferson, Madison, and Monroe.

In the first place, Tyler was not elected president at all, but came to that office from the vice-presidency at the death of William Henry Harrison, in 1841. He was the first vice-president to so obtain the place of chief executive. In the second place, he did not belong to the age of Washington, which produced the fathers of the Revolution and the Constitution, but belonged rather to the Jacksonian period of partisan politics.

But though Tyler was not one of the Revolutionary statesmen who had founded the government and whose succession to the presidency had "ended in a sort of a chill with John Quincy Adams," Tyler had education and experience which might have rendered him a suitable candidate for the presidency. He was the son of Judge John Tyler, who had served as governor of Virginia, from 1808 to 1811, and he had inherited traditions of public service. He had been educated at William and Mary college, from which he was graduated in 1807. Two years later he was admitted to the bar, at the age of 19; and when he was 21 his public career began with



TYLER'S ADMINISTRATION (1841–1845)

Bill to reestablish a National Bank
vetoed (1841).

Tyler's Quarrel with the Whigs; President
read out of the Party (1841).

Webster-Ashburton Treaty concluded with
Great Britain (1842).

Dorr's Rebellion in Rhode Island (1842).

First Telegraph Line completed (1844).

James K. Polk, Democrat, elected
President (1844).

Texas and Florida admitted (1845).

his election to the Virginia House of Delegates. Before he was called to the presidency by the death of his chief, he had served in both houses of the Virginia legislature, in both houses of Congress, as governor of his state, and as vice-president for one month.

With such a long term in office back of him, it would seem that his political opinions should be familiar to the people of America. Yet the uncertainty of his stand on important questions of the times made his administration one of the most exciting ones which the country up to that time had experienced. The trouble was that Tyler believed stubbornly in a strict construction of the Constitution. For this reason he had, while in Congress, opposed internal improvements, a national bank, and the "Tariff of Abominations" of 1828, and had allied himself with the Democratic party, which was the strict construction party. During Jackson's administration,

however, Tyler had opposed the high-handed policy of that leader of the Democratic party. Quite a number of Southern Democrats had joined Tyler in this opposition, and it was to capture their votes that the Whigs, in 1840, nominated Tyler as vice-president. They reasoned that, as vice-president, he would have no influence on the administration; and, as the Whigs adopted no party platform in 1840, Tyler did not find it necessary to make public his opinions on the questions of the day.

But the unexpected happened, and on April 4, 1841, Tyler was called upon to become the 10th president of the United States. It was with misgivings that the Whigs, recalling his strict construction views, saw him elevated to the place of chief executive; and their misgivings were fully justified.

Tyler vetoed the bill to reestablish the Bank of the United States shortly after he took office. The Whigs tried to draw up a new bill which would meet his approval; but although he seemed to accept it at first, when it was sent to him he promptly vetoed it also. This so angered the Whig leaders that they then issued a statement that they were in no way responsible for the President's acts.

The cabinet appointed by President Harrison promptly resigned, with the exception of Daniel Webster, secretary of state, who was engaged in important negotiations and continued in office for a time. The boundary on the northeast had never been satisfactorily defined and there had been constant friction between Canada and the United States; this was ended in 1842 by the Webster-Ashburton Treaty drawn up by Webster and Lord Ashburton, the British ambassador.

Tyler and the Whigs also quarreled over the question of the tariff and internal improvements. An alliance between the Democrats and a "corporal's guard" of Whigs, who followed Tyler out of the party, kept Congress from passing bills over the president's veto. A tariff bill, however, was finally framed which met the president's approval.

Tyler's quarrel with the Whig party angered the politicians, but his disposition not to deal in the open aroused the whole country. After consultation with only a few of his associates, he negotiated a treaty with Texas for the annexation of that commonwealth to the United States (*see Texas*). Without warning he sent the treaty to the Senate for ratification. It was promptly defeated, although many of the senators, especially those from the South, desired to see Texas come into the Union. Finally, on the last day of Tyler's administration, Texas was admitted by a joint resolution of Congress.

So Ended John Tyler's Career

His quarrel with the Whigs and his policy while in office not only destroyed all chance for Tyler's reelection to the presidency but likewise ended his political career. When his term of office ended, in 1845, there was nothing for him to do but to retire to his estate, Sherwood Forest, in Virginia on the James River. There he lived until the slavery crisis of 1860 again called him into action. In January 1861, he recommended that a convention of border states be held to find some means of averting the threatening conflict between the North and South. In accordance with this suggestion a peace convention met in Washington, on Feb. 4, 1861, and the ex-President was chosen to preside over the meeting. When its suggestions were rejected by Congress, Tyler hurried to Richmond, where in the state convention

he advocated immediate secession. When Virginia joined the Confederacy, Tyler was elected a member of the provisional congress and later was chosen to the permanent congress of the Confederacy, but died before he could take his seat in that body.

If we accept the testimony of two of Tyler's successors in the presidential office, the Confederacy did not suffer a great loss in his death. President Wilson said of Tyler that "Nature and habit forbade him a frank, straightforward, unhesitating course," and that "he had neither the initiative nor audacity enough for leadership." President Roosevelt was even more severe in his judgment, for he declared that "Tyler has been called a mediocre man, but this is unwarranted flattery. He was a politician of monumental littleness."

TYLER, WAT. As the principal leader of the first great revolt of the common people in England, Wat (or Walter) Tyler flashed into the light of history only to come to a violent end. This revolt, known as the "Peasants' Revolt" (1381) or as "Wat Tyler's Rebellion," was one of the first great struggles of labor against capital. It anticipated the fierce social struggles in Germany at the time of the Reformation, and the still greater upheaval of the French Revolution in the 18th century.

Those were troubled times. The workers both in country and city, the peasants and the artisans all over England, were angry and discontented. The peasants wanted to be free from serfdom, to pay a reasonable money rent for their farms, and both town and country laborers wished not to be compelled by law to work at wages that were no longer sufficient. Also the war in France was going badly, and many people felt that the counselors of the young king Richard II were responsible for its failure and the heavy taxes that oppressed them. A "mad priest," John Ball, went about preaching against the social and economic injustices and demanded that the distinction between lord and serf should be wiped out. This idea was expressed in the popular rhyme:

When Adam dived and Eve span,
Who was then the gentleman?

So when the government passed a law that everybody, rich and poor, should pay a poll tax of exactly the same amount, revolt broke out, the greatest risings being in the southeast near London. Under the leadership of Wat Tyler, whose energy and wit had forced him to the front, the men of Kent marched toward London, destroying tax rolls and title deeds, and burning houses of royal officials, lawyers, and unpopular landlords. When they reached London and were joined by crowds coming from other directions, they showed remarkable moderation and self-control. Only a few men who were held chiefly responsible for the bad government were sought out and killed. The chief desire of the rebels was to speak with the young King Richard II, a boy of 14.

When Richard came to them, Wat Tyler presented their demands. These were moderate. They asked

that serfdom be done away with; that the rent for their lands be fixed at a reasonable rate; and that no one should work for another except of his own free will and for wages mutually agreed upon. Furthermore they demanded that Richard give up his evil advisers and be directed by his people.

Richard granted everything, and the great mass of the rebels began turning homeward. Tyler himself remained till the next day, for another interview with the King. At this interview he was treacherously trapped and slain. With their forces scattered and their leader slain, the rebels were easily crushed. Parliament, representing only the upper classes, met and revoked all the King's promises. Many lords not only reasserted their old rights but tightened the bonds.

Thus the revolt of 1381 led to no startling changes. Yet the growing interest in sheep farming and the custom of leasehold farming gradually were bringing about many of the changes demanded, and from this date serfdom practically disappeared in England.

TYNDALL, JOHN (1820-1893). Huxley and Tyndall, the two men who first showed the English-speaking world that science is as wonderful and entrancing as a fairy tale, were so closely associated in the popular mind that while they were living their personalities were often amusingly confused. They were both great popular teachers of science; but while Huxley, trained as a physician, gave his energies to biology, Tyndall, largely self-trained and in early life a railway engineer, devoted himself to physics. He was greatly influenced by early association with Faraday, whose colleague he was as professor of natural philosophy at the British Royal Institution. Tyndall made original investigations on many subjects, including the motion of glaciers, the transparency and capacity of vapors and gases for radiant heat, and the opacity of the air for sound. His disinterestedness was shown when he concluded his lecture tour in America (1872-73); he placed all the money earned in the hands of trustees for the benefit of American science.

Among his best-known writings are: 'Heat Considered as a Mode of Motion' (1863); 'Fragments of Science for Unscientific People' (1871); 'The Forms of Water in Clouds and Rivers, Ice and Glaciers' (1872); 'Six Lectures on Light Delivered in America' (1873).

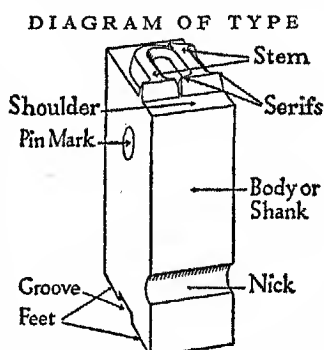
TYPE AND TYPOGRAPHY. Typography is the art of designing type and of arranging it into pages. It comprises, therefore, the first steps in the making of a printed book.

Type is a piece of metal nearly an inch long, having for its face a letter or other character, usually in high relief. The largest types, such as those used for advertising posters, are sometimes made of close-grained wood. Type metal is a special alloy of lead, tin, and antimony, sometimes with a little copper added (see Antimony).

The stem of a letter is the thick stroke or line of a letter; the hairline is the thin stroke. A serif (or cerif) is a short hairline or finishing stroke across the ends of the main lines in the typeface. The shoulder is the flat top of the body which supports

the face, and the body or shank is the part between the shoulder and the feet. The "nick" helps the typesetter to tell the front by touch.

In the early days of printing, when most printers designed and cast their own types, there was no uniformity of type sizes. The first successful attempt to establish a system of sizes was made by Pierre



This diagram shows all the principal parts of type. The printing surface of the letter is the "face." The height is 0.918 inch.

Simon Fournier, in 1764. Fournier's system was based on "points," a point being $\frac{1}{72}$ of the unit of size which he selected.

A point system was officially adopted in 1886 by the United States Typefounders Association. The pica or 12-point type which was selected as the standard is approximately $\frac{1}{6}$ of an inch, and a point

is about $\frac{1}{72}$ of an inch (actually .0138 in.; 72.46 points to the inch). The following table gives the old names and point system designations for small sizes:

Great primer.....	18 pt.	Minion.....	7 pt.
English.....	14 pt.	Nonpareil.....	6 pt.
Pica.....	12 pt.	Agate.....	5½ pt.
Long Primer.....	10 pt.	Pearl.....	5 pt.
Bourgeois.....	9 pt.	Diamond.....	4½ pt.
Brevier.....	8 pt.	Brilliant.....	4 pt.

No matter how the faces of type may differ as to style or size, the type bodies must be uniform in height, or, as it is properly called, height-to-paper, so that when the characters are locked in a page form the printing surface will be even. A variation of $\frac{1}{100}$ of an inch will spoil the appearance of a page.

ACTUAL SIZES OF TYPE IN COMMON USE

4 pt.	Quo usque tandem abutere, Catilina, patientia nostra? Quam diu etiam furor!
5 pt.	Quo usque tandem abutere, Catilina, patientia nostra? Qua
6 pt.	Quo usque tandem abutere, Catilina, patientia nostra?
7 pt.	Quo usque tandem abutere, Catilina, patientia no
8 pt.	Quo usque tandem abutere, Catilina, patien
9 pt.	Quo usque tandem abutere, Catilina, pati
10 pt.	Quo usque tandem abutere, Catilina,
11 pt.	Quo usque tandem abutere, Cat
12 pt.	Quo usque tandem abutere,

From the earliest times printers, when they wished to show samples of their types, quoted the opening lines of Cicero's famous first oration against Catiline. A noted printer once remarked jokingly that this constant use of the capital Q was probably responsible for its long tail.

As cast by American and English foundries, 15 type heights occupy 35 centimeters, making a standard height-to-paper of 0.918 inch.

Type is also measured in one other way, in width. A line of type is measured not in characters but in "ems." An em is a measure, equal to the square of

the type body, and was originally so called because the type body bearing a letter "m" was square; for example, a pica em is 12 points wide. In any font a space half as wide as the em is called an "en" of that font. The length of line required to set the alphabet of small or lower case standard pica letters is 13 ems. If the alphabet of any pica size takes more than 13 ems it is said to be a *fat* or *expanded* face; if it takes less space it is *lean* or *condensed*. Under this same rule alphabets of 10 and 9 point letters are standard at 13 ems; 8 and 7 point are 14 ems; and so on to 4 point, which is 18 ems. The widening of the letters for small sizes of type is required for clearness and durability. The legibility of type depends more on the width of the letter than on its point size. "Leading," or spacing between lines, also makes a page easier to read.

Font of Type

A font of type consists of an assortment of all the characters in sufficient numbers for ordinary composition. Additional characters are called "sorts," and when a font is short of any necessary characters it is said to be "out of sorts," thus giving the English language a popular or slang expression. Fonts are sold in "schemes" of 1,000 pounds, each letter or character supplying a specified number of pounds. In one founder's scheme, for example, there are 57 pounds of small "e," 37 pounds each of "a," "n," and "o," 25 pounds of "r," and so on to a total of 1,000 pounds. A typical font of roman and italic type would include these characters:

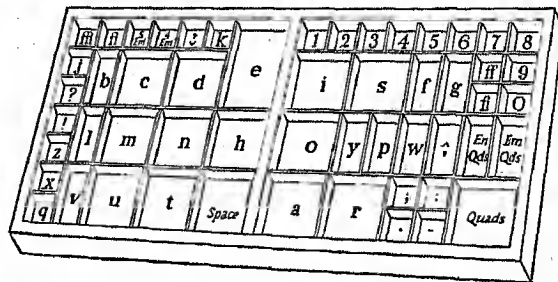
Roman a to z and æ œ ff fi ffi fl fl.	33
Roman figures and money signs.	12
Roman points , ; - ? ! etc.	10
Fractions	9
Roman capitals, Æ C and &	29
Roman small capitals	29
Italic lower case	33
Italic capitals	29
Italic points	5
Accented letters	25
References * † # etc.	7
Spaces, quadrats, dashes, and other marks	32
Total	253

Printer's Cases

A printer's case is a wooden tray, about an inch deep, divided into compartments of various sizes. A complete font requires two such trays, usually placed one above the other on a sloping frame. The upper case holds the capitals, the lower case the small letters. This position of the trays led printers to refer to capital letters as "upper case" and small letters as "lower case." In the upper case the capitals are arranged alphabetically, except for J and U. From the invention of printing until well into the 17th century, the capital letters J and U did not exist, I being used for J, and V for U. To introduce J and U in their proper places would have been an inconvenience to the typesetters, who were accustomed to the old arrangement; so J and U were placed after Z. In the lower case the letters used most frequently are placed to be nearest the hand of the typesetter.

To produce a matrix, or form from which type is cast, the type cutter first makes a counter-punch, or reverse of a letter, by cutting out the space within the letter on a piece of metal. This counter-punch is then forced into the end of the punch, a small bar of steel, making an impression of the inside of the letter. Next the outlines of the letter are cut away until it stands in full relief. When the punch has been hardened it is

THE PRINTER'S "LOWER CASE"



Here you see how the small letters are arranged in a standard printer's case. This arrangement puts the letters used most often nearest the hands of the typesetter.

forced into a bar of cold rolled copper, which then shows the letter in reverse and becomes a matrix.

The first printers cast types by hand. When the mold was filled with molten metal, the caster gave it a shake, driving the metal into every corner. An expert caster could produce about 4,000 letters a day.

Type casting machines were introduced about 1845, and in 1890 the Barth automatic type casting machine was perfected, capable of casting 150 types a minute. Nowadays almost all type, even that used for hand setting, is cast by machines. A printer or type founder can buy or rent a set of matrixes, from which an indefinite number of types may be cast. The use of hand-set type has been greatly reduced by the monotype, which casts single types, and by the linotype, which casts solid lines (see Linotype; Monotype).

Invention and Spread of the Art

For many years the invention of printing from movable types was generally credited to Johannes Gutenberg, of Mainz, Germany, about the year 1450. Many scholars now believe, however, that what Gutenberg did for printing was to perfect an existing process and put it on a practical basis. Gutenberg's contribution may have been the making of metal molds and matrixes from which he could cast type accurately and in large quantities.

By the end of the year 1500 printing presses had been set up in more than 250 cities throughout Europe. Books printed before the end of 1500 are called incunables or *incunabula* ("cradle books").

Among the printers of the incunable period certain names are so outstanding that every book lover should recognize their significance. The work of Gutenberg, Coster, Fust, and Schoeffer is treated in the article Printing. Anton Koberger of Nuremberg, who was a publisher as well as printer, put forth many important volumes, among them many editions of the Bible in

Latin and German. His most famous book is probably the 'Nuremberg Chronicle', printed in 1493 in two editions, one in German and one in Latin. Both editions are illustrated with hundreds of woodcuts. The portraits are all imaginary, and the same block is often repeated as the picture of many different persons. William Caxton, was the first printer in England (1476). He believed strongly in books for the common man, even though the national tongues, or vernacular, were still regarded as unworthy of literary use. Caxton printed many books in English, including Chaucer's 'Canterbury Tales' and Malory's 'Morte d'Arthur', but relatively few of them have survived because they were probably read to tatters.

After the first ten or fifteen years of printing, during which the art spread through the Rhine Valley and into other parts of Germany, the greatest advances in technique were made in Italy. The first pure roman type was used by the brothers John and Wendelin of Speier in Venice (1469). The next year Nicolas Jenson, also a printer in Venice but a Frenchman by birth, produced a roman font which is even more distinguished and still serves as a model for type designers. A few years later the foremost printer in Venice was Aldus Manutius, who began to publish the Greek and Latin classics in 1495. His mark, a dolphin and an anchor, symbolizes his motto, "Make Haste Slowly." This mark has often been copied by later printers. Aldus employed the greatest scholars in Europe, among them Erasmus, Marcus Musurus, Pietro Bembo, and Johann Reuehlin to edit the manuscripts from which he took his texts, and to correct the proofs. In 1501 Aldus first used the sloping type which we call italic; it was said, probably erroneously, to have been modeled on the handwriting of Petrarch.

After the death of Aldus in 1515, primacy shifted gradually to France, where the family Estienne (Stephanus in Latin) until the close of the century printed many books that were beautiful as well as textually important. Their finest printing was done with types, designed by Claude Garamond, which were the direct ancestors of Caslon and other "old style" faces. After 1560 Christopher Plantin, at Antwerp, using Garamond types, produced fine work, much of it ornamented with engravings after Rubens and other famous artists. Early in the 17th century the Elzevir family at Leyden and Amsterdam excelled all competitors; their neat 16mo and 32mo editions of the classics were highly prized in their day and are

still sought by collectors. Their best types, designed by Christopher van Dyck, are a refinement of Garamond. In France, under Louis XIV, who was keenly interested in typography, a series of fine fonts was cut (about 1693) for the use of the Imprimerie Royal (Royal Printing House); but generally in Europe type design and printing were of low quality during the late 17th century.

In 1720 William Caslon, an Englishman, designed a new face, modeled on the roman type of Nicolas Jenson. Caslon's designs, now often called "old style," are still in general use. They suffered a temporary eclipse in the last quarter of the 18th century, when the greatest influence was that of John Baskerville, who made his own papers, inks, and types, to produce a book which should be truly "elegant" in appearance. Then came the influence of an Italian, Giambattista Bodoni, who refined the elegance characteristic of Baskerville until his types had a spiky appearance. In France at the same time the dominant influence was that of the Didot family, men of more taste and education than Baskerville and Bodoni. The Didots were influenced by the same craving for classic elegance, but their books on the whole are more readable. All three of these printers refined their types too much for our taste by accentuating the difference between the heavy line and the hairline of a letter.

Near the close of the 19th century came a new revival in the art of typography, chiefly under the stimulus of William Morris. Morris attempted to return to the principles of the first printers, and considered the double page of the open book as a unit. Morris had many imitators, few of them successful, but he furnished the inspiration for the work of Thomas J. Cobden-Sanderson at the Doves Press, of Charles Ricketts at the Vale Press, and C. H. St. John Hornby at the Ashendene Press. Foremost

among the American printers who follow the Morris tradition that a book is an artistic unit, although their designs differ greatly, are Bruce Rogers, who is commonly regarded as the foremost American typographer; Daniel Berkeley Updike, both a commercial printer and an artist-typographer, whose influence has been second only to Rogers; Frederic W. Goudy, who has redesigned for use on typesetting machines many of the faces used by the earliest printers; Carl P. Rollins, Elmer Adler, Edwin and Robert Grubhorn, John Henry Nash, and Will A. Dwiggins, all practical printers whose distinctive styles repay study. (See also Books and Bookmaking; Printing.)

DEVICES OF FAMOUS PRINTERS



Almost all printers use distinctive printer's marks. From top to bottom these are the marks of Aldus Manutius, Bruce Rogers, and William Caxton.

TYPEWRITERS. Only a curiosity in 1880, the typewriter has today an indispensable part in the conduct of the world's business. Tabulating and adding mechanisms, added to ordinary typewriters, have made it possible to do all commercial bookkeeping on the same machine used for correspondence. Machines have also been devised which can be used for writing on cards, on the pages of a bound book, etc. Electrically operated machines typewrite automatically from a stencil pattern approximately 20 sheets of average length an hour. Small typewriters, weighing only a few pounds, are carried by army officers, explorers, and war correspondents into the far corners of the world or when campaigning.

Many years of effort have been necessary to develop these wonderful machines. The first experiments resulted in heavy, clumsy affairs. Some of these early machines were devised primarily for the use of the blind. In 1874 the first really practical typewriter was placed on the market. It was made by the gun manufacturers, E. Remington & Son, at Ilion, N.Y., from a model designed by C. L. Sholes, an editor living in Milwaukee. While this machine was heavy and awkward, the right idea was there, and from it the great majority of the typewriters of today have been directly developed.

The two prevailing models in typewriters are the type-bar and the shuttle machines. This first Remington, a type-bar machine, carried type letters on the end of steel bars. These bars, about 38 in number, were pivoted about a horizontal ring, making practically a complete circle of type-bars, and when the keys were depressed the type arms rose sharply to a common center on a rubber cylinder carrying the letter paper. In front of the cylinder and between it and the head of the hammer-like type-bar an inked ribbon was passed, thus giving the inked impression of the letter on the paper. The shuttle machine is represented by the Hammond typewriter. All the letters and signs used in this machine are cast on a curved plate of vulcanite called the "shuttle." When the key is depressed the corresponding character on the shuttle is brought into position, and the paper is forced against it to receive the impression. The shuttles for these machines are interchangeable, making it possible to produce many different alphabets and many different styles of type on the same machine. Another machine, the Blickensderfer, has all the type on a wheel which strikes the paper on the rubber cylinder, rotating to bring the desired characters into position.

By the closing years of the 19th century, when the typewriter came into universal use, there were nearly 100 models on the market. The greater number of these followed the conventional type-bar model modified so that, instead of the old horizontal ring, the frame holding the type-bars is an arc of a circle with the type-bars striking the common center on the front of the rubber cylinder instead of the lower side. By this arrangement the work is visible at all times. The arrangement of the keys which the operator strikes

is practically the same on all makes of typewriters. This common arrangement of the letters of the alphabet is known as the "universal" keyboard. The letters which occur together most often are placed so that the operator's fingers reach them successively in the most natural fashion. Each type-bar has two or more characters, and shift keys govern their use. By putting in several sheets of paper with carbon paper between them several copies can be made at the same time. An average operator can write 60 words a minute—about three times as fast as an average penman. Experts can keep up a rate of 100 words a minute or more.

The typewriter has had an important part in the entrance into the business world of the army of women workers. It was found that women could manipulate the typewriter as well if not better than men, and more than half the women engaged in clerical work are stenographers and typists. In the modern use of the typewriter the touch system by which the operator is taught to locate the position of the keys without looking at the keyboard is chiefly taught.

The United States leads the world in the manufacture of typewriters. Nearly half the factories of the country are in New York and Connecticut.

TYROL (*ti'rol*). Straddling the frontier between Germany and Italy lies the Tyrol (or Tirol), "the land in the mountains." Visitors usually enter this world-famous region by way of Zurich in Switzerland, and diving from tunnel to tunnel—the longest 6½ miles—under glaciers and tumbled snowy crags, arrive at Innsbruck, the chief city of this second and more smiling Switzerland. A clear air off the snow fields filters down through the pine woods, and the train winds through a panorama of snow mountains, fertile valleys, flowery pastures, rushing torrents, musical little streams, rocky peaks and quaint villages. Here and there the traveler catches a glimpse of peasant women in their broad velvet hats, embroidered bodices and aprons with snowy white linen sleeves, or a man in his feast-day costume of green velvet waistcoat, black velvet knee breeches, and thick brown woolen stockings, with a jaunty Tyrolean hat with feathered band perched on his head.

From the South the Italian Tyrol is reached by way of Verona, the railway following the very route along the Adige River which the ancient Romans used, and which is still marked by their milestones. This route crosses the Brenner Pass, which is the lowest in the Alps, and leads all the way from Italy to Germany without climbing higher than 4,500 feet.

The Tyrol is completely hedged in by mountains, and its whole area of about 10,250 square miles is ridged with heights and valleys. On the east side rise the Hohe Tauern with the Gross Glockner peak about 12,500 feet high; on the Bavarian or north side are the Bavarian Alps; on the Swiss or west side, the Ortler group soars almost 12,800 feet; and included in the Italian Tyrol to the southeast rise the Dolomites. The latter are favorites with mountain

THE HIGHLAND FIELDS AND LOFTY PEAKS OF TYROL



This is harvest time on one of the fields for which the lofty Tyrolean peaks grudgingly make room. Peasants are busy binding the grain, cut with the ancient sickle, for these tiny fields do not justify the introduction of modern machinery. In the middle distance is one of the roadside shrines so common in this country, with a crucifix under the penthouse; on the upper broken ground is a chapel.

climbers for their beautiful sharp peaks of crystalline rocks which shimmer in the sun.

The history of this lovely land has been by no means so peaceful as its calm mountain valleys. A border country, buffeted by the strife between Austria and Italy, it is often called "the Italian Alsace-Lorraine." In the days of the Roman Empire it was the province of Raetia. In the 5th century the Ostrogoths Teutonized the northern part, while the Teutonic Langobards (Lombards) who invaded the southern part became Romanized. Thus early the Tyrol acquired the dual character which still troubles it.

The counts of Tyrol controlled it from 1248 to 1363, when the last of the line, the famous ugly "Pocket-Mouth" Margaret, bequeathed it to the dukes of Austria. By the treaty of Pressburg, Napoleon gave it to Bavaria in 1805. The popular Tyrolean hero, Andreas Hofer, for a time fought off both French and Bavarians, but was finally captured and executed. Tyrol was returned to Austria by the Treaty of Paris in 1814.

To induce her to enter the first World War on the side of the Allies, Italy had been promised the extension of her frontier to the Brenner Pass, which has been the gateway of all the great invasions of Italy. Through it came the Teuton hordes who conquered Rome; that way came Hannibal with his

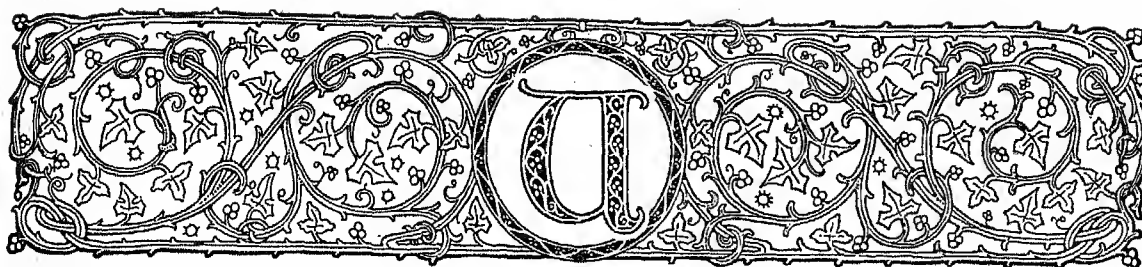
Carthaginians, Charlemagne, and finally Napoleon.

By the Treaty of Saint-Germain (1919), Italy was given all Tyrol up to the Pass. This region of 5,367 square miles, called the Alto Adige by the Italians, was divided in 1926 into two provinces, Trento and Bolzano. Trento is Italian by blood, speech, and customs. Bolzano, north of Trento on the German border, is German, and it has constituted a serious problem because of its resistance to the Italianization policy of the fascist régime. In 1939 arrangements were made to repatriate the German population. Some 10,000 German citizens were ordered to leave. Of the more than 250,000 German-speaking Italian citizens, who were given their choice of allegiance, about 175,000 voted to become German citizens and move to the Reich.

Italian Tyrol has citrus and olive groves, vineyards, silkworm culture, wood carving, and a large tourist industry. Bolzano province is being rapidly industrialized, with new hydroelectric, aluminum, automobile, chemical, and steel plants. The chief cities are Bolzano and Merano in Bolzano province, and Trento in Trento province (see Trent, Italy).

The Austrian Tyrol, 4,882 square miles, passed to German control in 1938. It has important mineral resources, and manufactures textiles, paper and wood pulp, and metal wares. The chief city is Innsbruck.





UKRAINE (*u'krān*). In the southwestern part of Soviet Russia, along both sides of the lower course of the majestic Dnieper River and bordering on the Black Sea, lies the region called Little Russia or "the Ukraine." It is a rich country, for the fertile soil of the famous "black belt" produces immense crops of wheat and other grains, as well as quantities of sugar beets, and its coal fields of the Donets basin are among the richest in Europe. There are also iron ore, petroleum, salt, and other minerals. Kiev, the capital (on the Dnieper), Kharkov, in the center of the rich agricultural region, and Odessa, the chief seaport (on the Black Sea), are the largest cities. Dnepropetrovsk, a city on the Dnieper, has a great hydroelectric power station and steel works.

The name Ukraine, which means "borderland" or "frontier," was given to this land when it was the bulwark of the Slavic countries against the Tatars and the Turks. Here in the 16th century gathered bands of adventurers, freebooters, and other restless and lawless men from Lithuania, Poland, Russia, and even Turkey, who became known as Cossacks (*see* Cossacks). In the 18th century Russia took most of the Ukraine, and Austria took the western part, where the Ukrainians became known as Ruthenians.

With the overthrow of the Imperial Russian government in 1917, the Ukraine declared its independence, elected a council (*rada*) at Kiev, and proclaimed itself the Ukrainian People's Republic. But the Bolsheviks, who were getting control of Russia, set up a rival government at Kharkov. When the *rada* government collapsed and the Poles invaded the country, Soviet Russia hurled its army into the Ukraine and tried to establish control. Russia, however, had to cede part of the Ukraine to Poland by the Treaty of Riga (1921). In 1923 the Russian Ukraine was incorporated in the Soviet Union as the Ukrainian Soviet Socialist Republic.

Russian armies occupied the Polish Ukraine in 1939 after Poland had been overwhelmed by the air forces and mechanized armies of Germany. This brought the area of the Soviet Republic of the Ukraine to about 213,000 square miles; population, 35,560,000. In 1941-42 the Ukraine was overrun by the German armies pushing toward the Black Sea and the Caucasus.

ULTRA-VIOLET RAYS. Ultra-violet "rays," like light, X-rays, and radio waves, form part of the electromagnetic spectrum (*see* Spectrum). They are called ultra-violet because they occur in the spectrum next to the violet. They are invisible, but can be regis-

tered on photographic plates or fluorescent substances. They are absorbed by ordinary glass, smoke, and fog, but penetrate quartz. Special glass is now being made to admit the ultra-violet radiation in sunlight. Ultra-violet rays from sunlight or from special lamps are used by physicians to prevent the bone disease called rickets and to treat other diseases. *Ergosterol*, a chemical present in food and in skin, produces vitamin D when irradiated. (*See* Radiation.)

UNIFORMS. Some marks of identification have always been necessary among fighting forces to distinguish friend from foe. In ancient times national dress and weapons were usually sufficient to serve this purpose. In the Middle Ages temporary badges, such as the white and red roses of the Wars of the Roses in England, were occasionally adopted. King Henry VIII of England introduced a complete uniform, clothing the royal archers in white gabardines with caps of a standard design. Uniforms for large bodies of troops, however, did not come into use until the rise of truly national armies, such as the armies of the Commonwealth in England. By the beginning of the 17th century there were distinctive uniforms for each of the national armies of Europe.

The styles of military uniforms were long merely civilian styles modified to give greater splendor and display. This tendency reached its height during the Napoleonic era, when the British "redcoats" vied in splendor with the French troops in their gorgeous green and white. With the improvement of firearms toward the close of the 19th century, conspicuous uniforms became dangerous, and service uniforms of the most inconspicuous colors possible came into use.

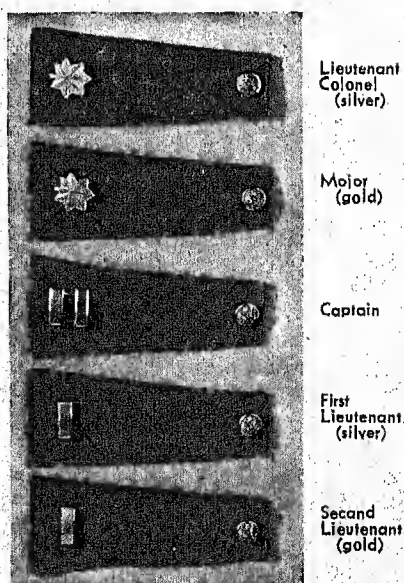
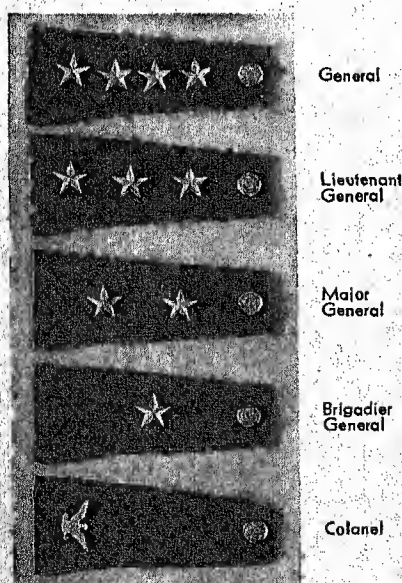
The British army led the way by introducing khaki (a dusty brown, from a Hindustani word meaning "dusty") for its Indian troops about 1880. After the Boer War this change became general throughout the world, and nearly all armies adopted service uniforms of various grayish, brownish, and greenish shades, generally called khaki.

The United States adopted olive drab in 1902. Germany introduced *feldgrau* ("field gray"), a dark olive-gray mixture in 1908. The French were slower to change, introducing "horizon blue" only after the first months of the World War of 1914-1918 had shown the disadvantages of the brilliant red and blue of the old infantry uniform. Still later they replaced the horizon blue with khaki. In most armies, both officers and men wear the same service uniform in both peace and war, and "dress" uniforms are rare.

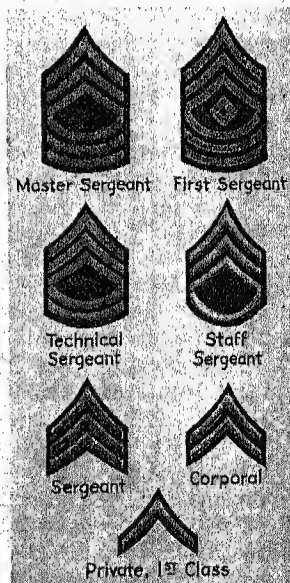
MARKS OF RANK AND SERVICE—U. S. ARMY



COMMISSIONED RANK (Shoulder Insignia)



NONCOMMISSIONED (Sleeve Insignia)

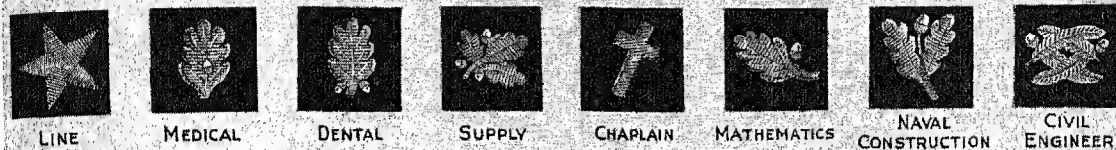
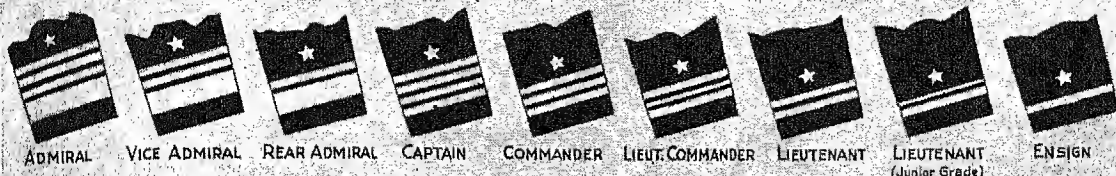


At the top are the insignia, worn on collar or lapel, which mark the combat arms and supporting services of the army. At the bottom are the shoulder insignia for commissioned ranks and the chevrons for noncommissioned grades. The Medical Corps insignia, shown in the second line from the top, is used for other branches by the addition of an appropriate initial letter on its face: "D" for Dental Corps, "N" for Nurse Corps, "S" for Sanitary Corps, and "V" for Veterinary Corps. The insignia for the Jewish chaplains consists of the Tablets of the Law surmounted by the Star of David instead of the Latin crosses worn by other chaplains (third line). An aide wears the number of stars which marks the rank of the general he serves. The single star on the badge shown in the fourth line means that the aide is serving a brigadier general.

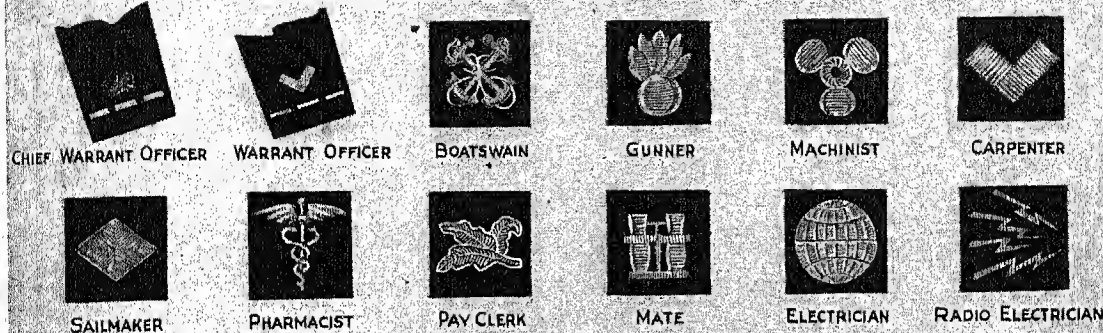
In addition to the insignia shown, all members of the Regular Army wear the letters "U.S." on the coat lapel. Members of the National Guard have an abbreviation for their state imposed upon the "U.S." In the navy (see opposite page) commissioned ranks are indicated by stripes on sleeve cuffs. The star above the stripes denotes an officer of the line (gunnery, navigation, or other combat duty). Officers belonging to the other corps, such as the Medical Corps or the Supply Corps, wear the corps device in place of the star. The specialty marks of warrant officers are also above the cuff stripes. The warrant officers here shown are a pay clerk and a carpenter. Petty officers show their rating in the space above the chevrons worn on the upper arm. The chief petty officer indicated here is a boatswain's mate (crossed anchors).

MARKS OF RANK AND SERVICE—U. S. NAVY

COMMISSIONED OFFICERS - RANK AND CORPS



WARRANT OFFICERS - RANK AND SPECIALTY



ENLISTED MEN - RANK AND RATING



These insignia are shown as they appear embroidered on the blue uniform. The colors are gold for commissioned officers, gold broken at intervals with blue for warrant officers, and red for enlisted men. Other facts about naval insignia are given on page 178.

During the Revolutionary War, American uniforms followed the current English pattern, with three-cornered hat, cutaway frock coat of blue faced with buff, buff waistcoat, close-fitting breeches, and gaiters. During and after the War of 1812, the coat was dark blue and single-breasted, with a high collar. The close-fitting breeches began to give way to white or light-blue trousers. Broad bands of white crossing upon the breast supported the knapsack and other equipment, and the costume was topped off by a cylindrical hat with visor and pompon. This uniform, with a few changes, survives in the dress uniform of the Military Academy of West Point.

The Civil War uniform was a dark blue coat and sky-blue trousers. The cap, called a *kepi*, was round and flat-topped with a visor; the coat was loose and buttoned tight about the neck with a "turn-and-fall" collar; and loose trousers were worn except in the mounted service. This uniform remained throughout the next generation with few changes. The kepi was replaced by the slouch hat and the spike helmet, and the trousers were caught in below the knee by leggings. Khaki appeared at the time of the Spanish-American War. In 1902 the army adopted the uniform which is essentially that still in use today throughout all arms and grades of the service.

The Army Uniform Today

The present army service uniform is olive drab, cotton for summer and wool for winter. The coat, or "blouse," is single-breasted with a bellows back and a lapel collar. For field duty the straight trousers are held in with leggings. A web belt, with two shoulder straps crossed in back, is worn by all commissioned officers in the ground forces under arms; at other times the "Sam Browne" belt, with a strap passing over the right shoulder to the left side, may be worn with the service blouse. The officers' dress uniform is blue—dark for the coat, light for the trousers—with variations in cut, headgear, and ornaments for different occasions.

The garrison cap is of the same material as the uniform, with a russet leather visor and round flat top, higher in front than in back. Officers wear the coat of arms of the United States above the visor. Enlisted men have a disk with a raised rim enclosing the coat of arms. When the men are under fire or in danger of it, a steel combat helmet is substituted. The broad-brimmed felt campaign hat formerly worn for field duty has given way to a close-fitting cloth cap, called a field cap.

Insignia on collars or lapels (see pictures, page 178) and various colors of trimmings indicate distinctions in arm, service, and bureau. There are also distinctive insignia for regiments and divisions. The colors for the fighting forces are: light blue, infantry; yellow, cavalry; scarlet, artillery; ultramarine blue piped with golden orange, air forces; scarlet piped with white, engineers. Enlisted men may wear the colors as trim on the edges of the field cap; officers below the rank of general wear them as trouser

stripes on the blue dress uniform. General officers wear cord edge braid of gold on the garrison cap; other officers, of gold and black intermixed; and warrant officers, of silver and black intermixed.

Officers are further distinguished by rank insignia on shoulder loops (see pictures, page 178), by the web belt, by differences in lapel, collar, and headgear ornaments, and by half-inch bands of braid on the lower sleeve—black for officers of the General Staff Corps, and brown for others. Warrant officers and enlisted men who held commissions in the first World War wear a similar band in forest green.

Uniforms of the Marine Corps

The Marine Corps uniform is similar to that of the army in general characteristics. Khaki trousers, shirt, and tie make the sunnier uniform for enlisted men. Officers add to this a coat. For winter, the uniform is coat and trousers of forest-green wool—a greener color than the army olive drab. With it are worn the khaki shirt and tie. The forest-green overcoat is worn with all uniforms. The blue dress uniform, corresponding to that of the army, is used also for certain types of ordinary duty. The blouse is dark blue with a standing collar and is piped in red. The trousers are light blue, and all officers wear a red stripe. A tan fiber helmet is worn with the summer service uniform, a forest-green cap with the winter service uniform, and a blue cap in winter and a white cap in summer with the blue uniform.

The Marine Corps emblem, worn by all marines, is a globe resting on an anchor surmounted by an eagle. Rank insignia and most chevrons are like those of the army, as pictured on page 178. The chevrons are forest green on khaki for summer service, forest green on red for winter service, and gold on red for dress.

Naval Uniforms

The service uniform of the navy is blue. White uniforms are worn for dress in summer. The blue service coat for all grades above first-class petty officer is a double-breasted tunic with a rolling collar. The white coat for chief petty officers is of similar cut, but commissioned and warrant officers wear a single-breasted white coat with a stiff, standing collar. Officers also wear a work uniform in summer made of lighter-weight material in tan or similar color. The officers' full dress uniform is dark blue with gold epaulets and gold trouser stripes. With it the cocked "fore-and-aft" hat is worn.

Petty officers and non-rated men wear a loose-fitting jumper with a square sailor collar. The collar and cuffs of the dress jumper are trimmed with three stripes of white tape. The collar also has a star in each corner. The undress jumper has a plain collar and no cuffs. The trousers are cut straight, so that they can be drawn above the knee for "wet" work. On shore patrol, field duty, and parade they are caught in below the knee with khaki leggings.

All grades above first-class petty officer wear a stiff flaring cap with a flat top and a black visor. Petty officers and non-rated men wear knitted arctic

caps known as "watch caps," blue "flat" hats, or round white hats with wide brims turned up all around. Enlisted men below the grade of chief petty officer wear "peacoats," or short overcoats; all other officers wear long overcoats.

The rank insignia of the navy are simpler than those of the army. Commissioned grades are indicated by the number and size of gold stripes worn on the lower sleeves of the coat and on the stiff dark blue shoulder marks of the overcoat, the white dress uniform, and the tan work uniform. (See pictures, page 179.)

Service Ornaments

During the World War of 1914-1918, wound and war service chevrons were adopted by the army. A gold chevron may be worn on the left sleeve for each

six months of war service abroad and a sky-blue chevron for each six months of war service in the United States. A similar gold chevron may be worn on the right sleeve for each wound received in action.

Enlisted men of the army wear a diagonal service stripe of olive-drab material on the lower left sleeve for each three years of service. The Marine Corps and navy wear a service stripe for each four years of service. Marine Corps stripes are of the same color as the chevrons. Those of the navy are red on blue clothes and blue on white clothes. After 12 years of continuous service, with good conduct, men of the navy may wear gold service stripes. (For information on decorations, service medals, and badges, see Decorations and Titles of Honor.)

THE UNITED STATES OF AMERICA

Its Geography—Its People—Its Industries

UNITED STATES OF AMERICA. It is because the United States is made up of every race under the sun that it is called "the great melting pot." The thin sprinkling of red Indians has long been almost lost to sight under the flood of immigrants from other lands. Puritans from England driven out by religious persecution landed on Plymouth Rock; the Dutch seeking trade came to New York; Swedes and English settled New Jersey; Quakers and German religious refugees founded Pennsylvania; proud English Cavaliers built up Virginia with the labor of Negro slaves from Africa; Spaniards seeking golden treasures settled Florida, Texas, and California; and Germans, Austrians, Poles, and Irish for economic or political reasons settled the great Mississippi valley. On the Pacific slope and in the islands beyond is a medley of races—Malays, Japanese, and Chinese from the Orient; Spaniards recalling the days of old Spanish empire round the world; a sprinkling of descendants of Russians in Alaska—and Italians, Jews, Slavs, Armenians, and Syrians are found in every considerable city in the great possessions under the Stars and Stripes. No country in the whole round world—not even Great Britain with its far-flung colonies in every clime—shows such a diversity of races and peoples.

And all these peoples—with one exception—came seeking the same noble end: Freedom, Liberty for each man, woman, and child to work out the best that was in him, for his own good and the good of humanity.

Even the hapless Negroes—though long enslaved in the South—led a kindlier existence for the most part than they would have in their native Africa, preyed on by every warrior who had a spear or a club. Whether the "great experiment" of the American Republic succeeds or fails depends on every citizen's remembering what brought all the different races to America,

and that in loyalty to his flag he is helping to realize a universal brotherhood of all races in Freedom and Self-government.

The land in which this experiment is being worked out is well fitted by nature for such an enterprise. Its distance from the Old World encourages a spirit of self-reliance; and its variety of surface, soil, and climate make it largely independent economically. Its great-

ness and variety challenge the best powers of men, and afford better opportunities for vast multitudes of the common people than the world has ever seen before. Read the article on North America and you will understand better how its situation and surface favored the rapid growth of such great new nations as the United States and Canada.

To the United States have fallen the most favored regions of the New World. Continental United States lies wholly within the temperate latitudes, the most favorable situation for the development of a high civilization. Its vast area—about equal to that of Europe—the fertility of its soil, and its inexhaustible mineral wealth have made it within a century and a half of national existence one of the foremost powers of

Extent.—North to south, 1,598 miles; east to west, 2,807 miles. Area, 3,022,387 square miles. Population (1940 census), 131,669,275; with territories and possessions (except Philippines), 134,265,231.

Physical Features.—Atlantic Coastal Plain rising to the Appalachian Mountains; Central Plains with Great Lakes Basin to the north and Gulf Coastal Plain to the south; Great Plains; Cordilleran system of mountain ranges running north and south (highest point, Mt. Whitney, 14,495 ft.) and dropping abruptly to Pacific Ocean. Rivers and lakes: Hudson, Delaware, Susquehanna, James, and Great Lakes—St. Lawrence system flowing into the Atlantic Ocean; Ohio—Mississippi—Missouri and Rio Grande, into the Gulf of Mexico; Colorado, into the Gulf of California; San Joaquin—Sacramento and Columbia, into the Pacific.

Products.—Corn, wheat, oats, cotton, hay and forage, fruits and vegetables; cattle and dairy products, hogs, sheep and wool, horses; coal, petroleum, natural gas, clay products, cement, iron, copper, lead, zinc, gold, silver, aluminum; lumber and timber; fish products; meat packing, textiles, steam and electric cars, iron and steel products (including machinery, foundry and machine-shop products), automobiles, clothing, flour and meal, petroleum products, boats and ships, bread and bakery goods, shoes, leather goods and rubber goods, electrical machinery, chemicals.

Cities.—New York (7,454,995), Chicago (3,396,808); Philadelphia, Detroit, Los Angeles (over 1,000,000); Cleveland, Baltimore, St. Louis, Boston, Pittsburgh, San Francisco, Milwaukee, Buffalo (over 500,000); Washington (capital, 663,091).

the world. Though it is the world's greatest producer of both food and raw materials for manufactures, it has as yet reached only a fraction of the development of which it is capable. For every square mile of its area it has a population of only 44.2 persons, while England has 742 persons to the square mile. All the people of the whole world could be set down in the continental United States and it still would be less crowded than the England of today, for its area is 3,022,387 square miles, or nearly 1,935,000,000 acres. With Alaska and its other possessions, its area is 3,733,993 square miles.

From West Quoddy Head in Maine (the easternmost point of the United States) due west to the Pacific Ocean, the distance is 2,807 miles, and from the southernmost point of Texas due north to the Canadian border (the 49th parallel), it is 1,598 miles. The southernmost point of the mainland, however, is Cape Sable, Florida (49 miles farther south than any point of Texas). The westernmost point is Cape Alava, Washington; the northernmost is a small detached land area bordering the Lake of the Woods in northern Minnesota. The boundary line with Canada is 3,987 miles long; with Mexico, 2,013 miles. The total coast line is 11,936 miles long; 5,565 miles on the Atlantic, 2,730 miles on the Pacific, and 3,641 miles on the Gulf of Mexico.

Two Great Mountain Systems

The chief mountains of the United States consist of two great uplifted ridges running north and south, one close to the Atlantic coast, one close to the Pacific coast. The eastern ranges are known as the Appalachian system, the western as the Cordilleras. Neither system is a continuous long, even line north and south. They are broken up in parallel ridges and cut across by lower levels called "passes" and "gaps," through which rivers tear down from the snows and rains of the mountains, presently to become the quiet broad streams of the farm plains as they flow out to the sea. (See Appalachian Mountains; Rocky Mountains.) In some places these ridges throw off lateral spurs running east and west, or slanting diagonally, such as the Olympics up in Washington or the Uintas in Utah. These irregular lateral spurs, which are sometimes loftier than the main mountains, as in Washington, throw the traveler off the straight line east and west and send rivers and railroads round great curves. The Columbia River has to turn two great curves like the letter S to push through the mountains down to the sea. The Sacramento has to flow almost due south and then, like a snake lazily turning its head, has to twist west to reach the Pacific.

The mountains in the east are far older than in the west, and so they have been worn down by the ages into mere fragments of what they were. Mount Mitchell in North Carolina, 6,684 feet, is not half so high as Pikes Peak in Colorado, 14,110 feet, or the Mount of the Holy Cross, 13,986 feet, or Gannett Peak in Wyoming, 13,785 feet. Washington has its Mount Rainier, 14,408 feet, and California has Mount Whitney and

ten other peaks that soar above 14,000 feet—more than twice the height of Mount Mitchell.

The young rugged Cordilleran system is the wonderland of the United States. It abounds in scenes of marvelous beauty and grandeur, such as the Grand Canyon of the Colorado, the valley and falls of the Yosemite, the snow-clad peaks and eternal rivers of ice in Glacier National Park, and the steaming geysers of Yellowstone Park. Its principal group of ranges, the Rocky Mountains (6,000–14,000 feet), extends mainly through northern Idaho, western Montana and Wyoming, and central Colorado. The Rockies are separated from the Cascade Range (6,000–14,000 feet) in east central Washington and Oregon by the Columbia Plateau, from the Sierra Nevada (10,000–14,000 feet) of west and central California by the Great Basin, and from the Western Sierra Madre (5,000–8,000 feet) by the Colorado Plateau in central Arizona.

The "Great American Desert"

The high ranges between the Pacific coast and the plateaus bar out most of the moisture-laden atmosphere blowing in from the Pacific; so these plateaus were misnamed by the earliest explorers the "Great American Desert." They are not rainless, nor are they long flat areas of desert sands. They are upland valleys and table-lands, needing, for the most part, merely irrigation or scientific farming to make them produce in abundance. Some, lying 4,200 to 6,000 feet above sea level, are covered with sand and weathered lava. Others lying still higher are successions of valleys and mountains clothed in great yellow pine and spruce forests. The Columbia Plateau, covering most of southeast Washington, eastern Oregon, and southern Idaho, forms a large part of the Columbia River drainage basin, and it represents an ancient and enormous lava field in most of its extent. The Colorado Plateau of southwest Colorado, northwest New Mexico, southeast Utah, and northern Arizona is noted chiefly for its Grand Canyon (see Grand Canyon) of the Colorado River. The Great Basin is a remarkable section of the United States covering most of Nevada, the west part of Utah, and southeastern California. It is a region of interior drainage; that is the small rivers of the region either disappear into "sinks" or unite to empty into some interior salt sea or lake such as the Great Salt Lake of Utah. This region is also the scene of the mythical "Great American Desert," which is really confined to the small deserts of the Great Salt Lake Desert in northwest Utah and the Black Rock Desert in northwest Nevada, and the somewhat larger Mohave and Colorado deserts in southeast California. The only other desert in the United States is an arm of the Sonoran Desert of Mexico, known as the Gila Desert in southwest Arizona.

In addition to the ranges of the Cordilleras already mentioned there are the Coast Ranges (3,000–5,000 feet), lying very near to the ocean beach and extending north and south the full length of the Pacific coast.

The most important valleys are those of the Puget Trough, extending south from Puget Sound through Washington and Oregon and lying between the Coast Range and the Caseades; the valley of California in the central part of the state of that name and between the Sierra Nevada and the Coast Range; and a small district around Los Angeles.

Vast Stretch of Plain and Plateau

Between the ramparts of the Cordilleran system on the west and the Appalachian system on the east lies a great lowland area, a vast system of plains and plateaus a thousand miles wide. From the foothills

language, working for one end. In the South Atlantic states, the mountains recede 250 miles from the sea, so the settlers here spread out from towns in big tobacco and cotton plantations up the river banks. This is one of the reasons why there were fewer cities in the South than in the North.

But when settlers had at last crossed the Appalachians into the Central Plains and the great Mississippi valley, conditions were reversed. There they found no mountains to protect them from Indian raids. The settlers advanced fighting for every inch of ground. In 1700, it is said, you could ride from Maine to

HOW THE FOREIGN-BORN POPULATION OF THE UNITED STATES IS DIVIDED



These figures show the proportions in which the nations represented have contributed to the present foreign-born population of the United States. You will notice that Great Britain, exclusive of Ireland, furnished relatively few in recent decades, that the great flood of Irish immigration of the early 19th century has subsided, and that the Italian-born are now the most numerous single element.

of the Rockies the Great Plains slope gently to the Mississippi valley, from an elevation of about a mile above the sea to a few hundred feet. The Great Plains are continued eastward to the Appalachian Plateau by the Central Plains, a broad gently rolling region, mostly prairie, nowhere more than a few hundred feet above sea level. In the South these divisions merge into the Gulf Coastal Plain, which comprises the major part of the area of the states bordering on the Gulf of Mexico. A glance at the map (page 200) shows that there are only three breaks in this vast system of plains; the Laurentian highlands about Lake Superior (see Laurentian Plateau), the Black Hills, and the Ozark Mountains (see Ozark Mountains).

The mountains, both the old low mountains of the east and the rugged young giants of the west, were an important factor in compelling the first settlers to keep together in close communities. In the New England states, the mountains crowded the settlers in the narrow Coastal Plain between the sea and the mountain wall in an area only from 70 to 100 miles wide. The mountains protected these settlers from the Iroquois raiders in the west and kept them clearing the lands between the mountains and the sea till more than two million people from a dozen different countries in Europe had become as one people, speaking one

Virginia and sleep in a settler's cabin every night; but even as late as 1800 you could float down the Ohio and the Mississippi from Pittsburgh to the French town of New Orleans on the Gulf of Mexico, and not see a cluster of settlers' cabins oftener than once a week. The settlements were spread far apart on the river banks; and these widely separated groups did not learn to work together with one aim till all sections of the country were joined after the great Civil War of 1861-65 into a true "United" States.

But if the mountains were the barriers which confined the first settlers to the Atlantic seaboard, the rivers which broke through the mountain passes were the silver threads which guided the bold pioneers of later generations through the gaps and across the plains from the Atlantic to the Pacific. New Englanders and emigrants from lower New York pushed up the Hudson and across New York along the Mohawk, usually crossing to the Ohio and using its tributaries to reach their home sites. Settlers from the Middle States found an easy passage across the mountains by following the Potomac through the gap at Harpers Ferry. By this route the eastern seaboard and the Mississippi were first linked entirely by rail. The men from Virginia and the Carolinas who followed Daniel Boone's trail went up their rivers to the

ridges, then through Cumberland Gap, whence they could float lazily down the Cumberland and Tennessee rivers to the land of plenty. More adventuresome hunters and traders paddled up the Mississippi and its great western tributary, the Missouri, carrying their traps and guns to the mountains, and, a generation later, across to the Columbia and down to the Pacific Ocean.

The Great Waterways and the Pioneers

In all, these early homeseekers could travel by water on navigable streams for 20,000 miles. As for the Great Lakes, these early pioneers could hardly believe they were not inland seas. The first explorers like Radisson and Marquette and La Salle really expected to find China and Japan just beyond the Great Lakes! Lake Superior is 383 miles long, almost as long as from New York to Buffalo. From the head of Lake Michigan to the foot of Lake Erie is a clear path of 1,000 miles; while from the Mississippi east and west run rivers for a distance of 14,000 miles, with arable clear parklike lands for an area of 1,240,000 square miles—a great farm basin two-thirds as large as European Russia.

Shut off by the mountains behind them, with faces set to the west, always fronting Indian attacks and French raids from Canada and Spanish intrigue from the south, what wonder that these settlers of the Mississippi Basin developed a new type of men and women, fearless, forgetful of all past history and nationality, a law to themselves, free as air, working like demons for the new opportunity for each man and woman to arise and possess the land and his or her share of wealth in that land? Strangers who come to America for the first time declare you never meet the true type of American till you cross into the great Mississippi valley. Here is the true melting pot of the whole world; and the rivers were the silver threads that led these New World argonauts to their destiny of founding a new nation.

The Mississippi and Missouri rank with the longest rivers in the world—3,988 miles. The Colorado and Green rivers, flowing 2,090 miles to the Pacific, rank next. Then follow the Rio Grande (from the mountains of Utah and Colorado) and the Yukon (threading the whole length of Alaska and part of Canada), each 1,800 miles long. The Arkansas (1,450 miles), the Ohio and Allegheny (1,306 miles), and the Columbia (1,214 miles) are the next longest open roads to the wilderness. Although the Hudson is only 306 miles long and the Potomac 287, these rivers were important because they, like most of the rivers on the Atlantic seaboard, led inland to passes through the mountains. They were arrows pointing a path for the explorers.

How the Little Beaver Helped Along

Every boy and girl has wanted to know on what the seven bright bands of the rainbow rested; and some little boys and girls have set off to chase the rainbow ends and find out. It was the same with the explorers and settlers of America. Camped at the river mouths

they found Indians in skin tepees, with wonderful furs for clothing and rugs on their tent floors and beds. The furs in greatest use in Europe at that time were beaver for hatting, and ermine for royal robes; and the Indians traded their beaver and ermine in piles for colored beads, for knives, for iron awls and for trinkets. So the white men soon found they could come to America with shiploads of such cheap wares and go back loaded to the water line with furs that paid the cost of the voyage and left a handsome profit. The first settlers too had to have some goods to send back to Europe in exchange for the powder and firearms and ships and silks and tea and other things they could not yet make for themselves; and here were the Indians with priceless furs ready to trade them for trinkets. So while they farmed, the settlers also took time to trade in furs and to outfit canoes and boats to ascend the Hudson, the Delaware, and the other rivers.

And the little beaver that furnished this valuable fur was everywhere. Wherever the Hudson widened out into marshy flats as at Lake George and Lake Champlain, or where the Mohawk led back to the lake country of central New York, or the Delaware and Roanoke and James led back to marshy mountain meadows joining the headwaters of the rivers flowing down to the Ohio and Mississippi, there the little brown beaver had his wattled house of little sticks and logs and clay in millions. And there were more beaver colonies clear to Lake Superior and across the plains up to the Rockies, where the Colorado and the Snake and the Columbia led down to the Pacific.

The little beaver was the first bright color in the rainbow that led the settlers across the continent from Atlantic to Pacific. It kept the settler alive till he got his farm or his fisheries or his shipbuilding or his tobacco plantation going prosperously enough to support him.

Riches Free for all Men

When the little brown beaver had led the settler up the open silver road of the rivers across the mountains to the rivers flowing down the great plains to the Mississippi, the second band in the rainbow began to play its part. Here was the richest open free land men had ever seen in all the history of the world. "Why do nations fight for an arid rock in Europe," Radisson had asked in 1660, when he first beheld the Mississippi Basin, "when here is land enough for all men free to all men without fighting for it?" Why, indeed? It was from the Indians that the white settlers had first discovered the uses of tobacco and corn; and the great Mississippi valley would grow not only the Indian corn and tobacco, but also cotton and grains and vegetables. And the grasses that grow so abundantly on these plains would sustain cattle by the million. So the frontiersmen sat them down on the great plains and became settlers, instead of rovers. The corn and grain and grass lands of the plains held these wandering fur hunters down to mother earth at last; and only the more venturesome pushed on after the little brown beaver across the Rockies, or to

trade with the Spaniards of New Mexico 800 miles by the Santa Fe Trail from St. Louis.

Practically free land of great natural fertility capable of growing grain to support the world was the second band in the great rainbow of hope belting the New World.

As the settlers farmed, they found coal in great beds in Pennsylvania, in West Virginia, in Alabama, in Indiana, in Illinois, and in Ohio. They found iron at the head of the Great Lakes and copper in the Upper Michigan peninsula, and gold and silver and copper in the Rockies from Colorado and New Mexico and California through Utah and Nevada and Montana. Thereafter the forward push westward, ever westward, was not a leisurely hunt up the great river one year after furs and out the next year after goods. It was not a hurried rush for free land and a slow development of farms from a few acres of wheat and corn to full areas in crop, perhaps after 40 years of slow growth. The push west became a mad stampede for rich metal deposits. After the discovery of gold in California in 1848, settlement went forward faster west of the Mississippi in 50 years than it had gone east of the Mississippi in 250 years.

Mines were the third band in the rainbow spanning the new nation.

The Rainbow's Fourth Band of Color

When the settlers entered the forests of the Alleghenies and the Adirondacks and the Cumberlands and even Wisconsin and Michigan, they found them an obstruction to settlement. They concealed lurking Indian foes. They hindered the planting of crops. They fostered a damp atmosphere that was reputed to cause agues and malaria. So the settlers ruthlessly slashed these forests, often setting great tracts on fire, to clear the land for farming. They left the forests standing only where they deemed the land too hilly or too rocky or too sandy for farming. In the east they left only patches of the old hardwood forests in Maine and the White Mountains and the Adirondacks and the Cumberlands.

But when the settlers poured into the Great Basin of the Mississippi, it was a different story. There they found no forests except in parklike clumps on the uplands or round the lakes. Whether the forests that once covered this region were burned off long aeons ago or destroyed by some glacial rush of waters or crowded out by the grasses which thrive more luxuriantly in the powdery brown soil of the prairies, science does not know; but every boy and girl knows

that the 50,000,000 people living and toiling in the great Mississippi Basin need wood for houses, machinery, factories, barns, railroad ties, and a hundred other purposes. So the great forests of the Rocky Mountains and the Pacific slope became tremendously valuable, and about a generation ago the government began setting great areas aside as national forest reserves; and lumbermen, who had cut most of the timber in the southeast and in Michigan and Wisconsin, began moving their mills to the national forests of the mountains and the Pacific coast, where the trees grow so large that the lumber from a single big red cedar will build a ten-room house.

The timber of the national forests became a fourth band in the chase to the rainbow ends across the continent. Timber cruisers blazed trails through forests of Idaho and Washington and Oregon and California and Colorado and central Utah, where no fur trader had ever footed a path.

The bands of the rainbow now became strong with girders of iron and steel from the mines, and timber from the big forests. Lumber, burned

as worthless down to 1870 and sold for \$10 and \$15 a thousand board feet in the '80's, became worth \$15 and \$20 a thousand in the early 1900's and double that price a few years later. Lumber became as valuable as the fur and the farm lands and the mines.

But we have not yet finished with the rainbow. "The sheep's wool which grew on trees in India," as the old traveler, Marco Polo, described cotton, had proved so profitable in the Southern states that the settlers had carried it with them across the Mississippi to Texas and Arizona. Cotton was added to the rainbow bands, weaving them stronger than ever.

But in the last half of the 18th century inventors in England had devised machinery which would spin and weave cotton far faster than human hands. The whirling wheels they set in motion created great cities crying for cotton, more raw cotton, for the people of Europe. And as the cities of Massachusetts grew larger and larger from shipping American goods to Europe and bringing back goods for the United States, they began to see it would pay them better to manufacture the cotton on this side of the ocean and ship it out in compact cloth form than to ship it out in big clumsy bales and buy back the manufactured goods at many times a higher price from European factories. Also they reasoned the same way about leather for shoes, about lumber, and about iron and steel. So

OCCUPATIONS AND RELIGIOUS BODIES

AGRICULTURE	ROMAN CATHOLIC
MANUFACTURING	BAPTIST
TRADE	METHODIST
TRANSPORTATION	LUTHERAN
MINING	JEWISH
PROFESSIONS	PRESBYTERIAN
ALL OTHERS	PROTESTANT EPISCOPAL
	DISCIPLES OF CHRIST
	OTHER DENOMINATIONS

The chart at the left shows the relative number of persons engaged in various occupations. The chart at the right shows the comparative size of the largest denominations, according to the latest federal census.

textile factories began to spring up all through Massachusetts, and machine factories and sugar-factories all through New York and New Jersey and Delaware and Rhode Island and Pennsylvania and Maryland; and flour mills to grind the wheat at Buffalo and Minneapolis; and farm machinery factories at Chicago and all through the Middle West to make the lumber and steel into farm implements; and steel mills at Pittsburgh and Cleveland and Chicago where the coal to make steel met the iron coming down the Great Lakes.

Putting the Waterfalls to Work

In the early days, wherever there was a waterfall, the settlers put up old-fashioned wooden water-wheels, such as you can see on countless little deserted streams all through the East; and with these water-wheels they drove the machinery that ground their wheat into flour. Presently they began to use coal to drive bigger and bigger machinery for bigger factories; and the old water-wheels began to be deserted. But now came another change—electricity. It was found that if you had a strong enough waterfall its power could be used to generate electricity that would drive any machinery that man could invent. So where there were waterfalls or where waterfalls could be created by great dams, bigger and bigger factories sprang up to manufacture forests into lumber and paper, cotton into dress goods, wool into clothes, iron into steel, and even nitrogen in the air into fertilizer for the farm; to drive street-cars and light cities. It cost millions of dollars to put in the great dams and build the great whirling turbine wheels; but once the plant was built, instead of shoveling coal to get the steam, the water had simply to be turned on the wheel and one man could do the work of four or eight.

Look at the map now! Cotton mills, woolen mills, canning factories, paper mills in New England wherever there are waterfalls. Factories on the upper reaches of the Hudson and the Mohawk; cotton mills in the South, where there are both water power and raw cotton; fertilizer and aluminum factories at Niagara Falls; other aluminum factories in the Pacific Northwest, the South, and on the rapids of the St. Lawrence; pulp mills where are water power and pulpwood in upper New York and New England and Virginia; great smelting plants and quartz mills in the Rockies at the Great Falls of the Missouri; plants in the Sierras to impound waters for irrigation and at the same time to supply electricity for lighting houses and city streets, running street-cars, and driving the wheels of many industries.

Beaver, free land, mines, forests, cotton, factories—six bands of the rainbow binding East to West have now been found. But the seventh color in the rainbow was perhaps the most wonderful of all. It is very recent. It is barely half a century old; and it has poured liquid floods across the country of greater value in some years than the world production of gold. It rivals coal as the nation's most valuable mineral.

Petroleum is worth almost as much as the annual corn crop, and two or three times as much as the annual wheat crop of the country.

You recall the region in the far west once known as the "Great American Desert." Once it was considered an arid waste, but it has grown smaller and smaller every year until now almost every section of it can be made to produce something. Still there were spotted sections in this and other regions that seemed utter waste; areas in Pennsylvania and West Virginia that were neither farm land, nor coal lands; dry hard clay burned lands—where prehistoric forests had burned out the very humus of the ground—in Kansas and Oklahoma and Wyoming and Texas and southern California. It looked as if this were a foolish wasteful mistake; but Nature never makes mistakes. She hides her secrets and makes us dig for them.

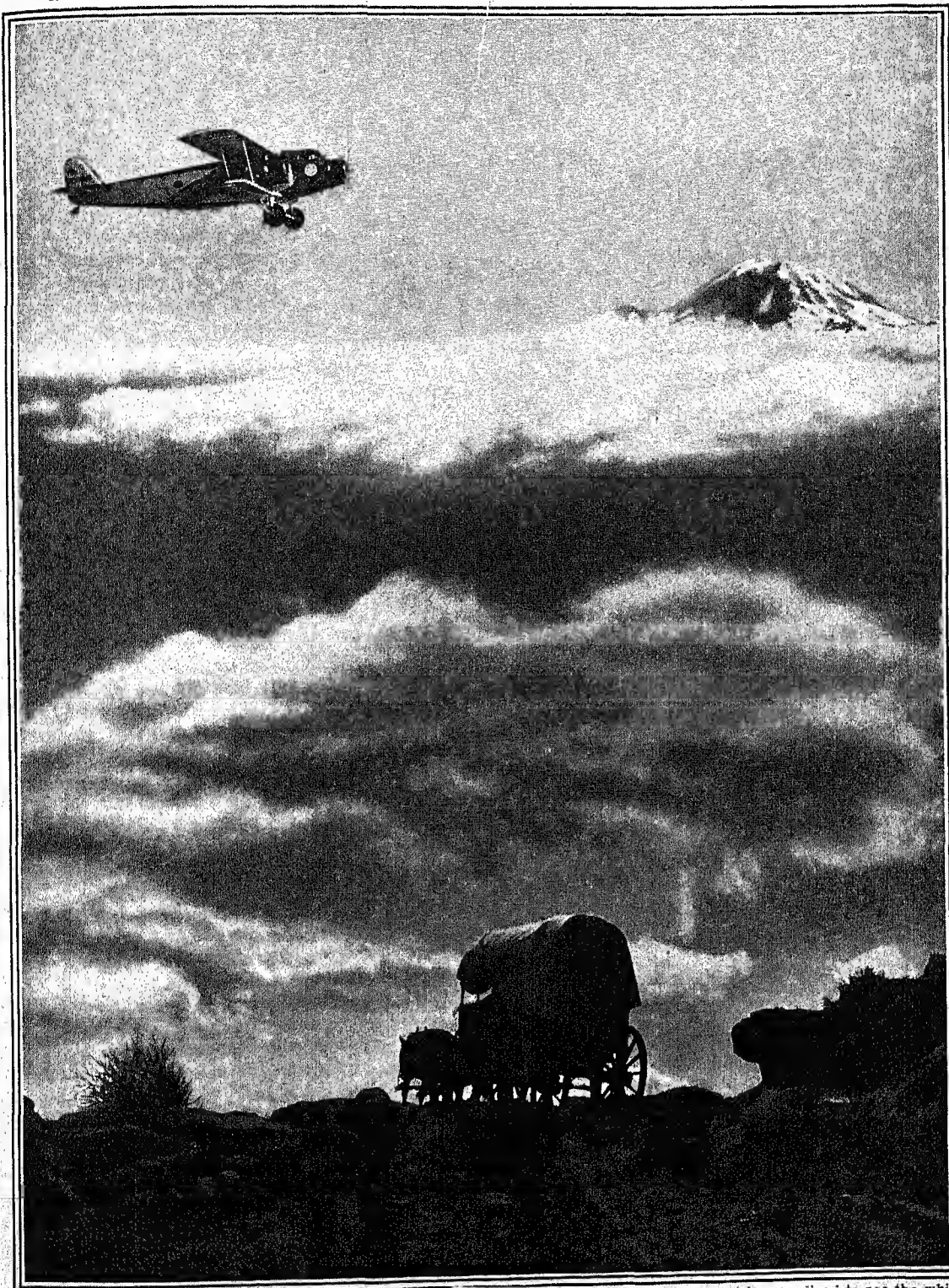
The story of "the Oil Age in America" is too long to tell here (see *Petroleum*); but "gushers" were found in Pennsylvania, West Virginia, Kansas, Oklahoma, Texas, Louisiana, and southern California that spouted from 25,000 to 100,000 barrels a day. Pipe lines were built to carry it to the refineries, where it is distilled into kerosene, paraffin waxes, gasoline for motors and tractors and airplanes and submarines, coarse fuel oil for engines on trains and naval ships and great merchant vessels. And, oddly enough, some of the greatest oil gushers were found in those waste sections where white men had selfishly thrust Indian tribes like the Osages, because the lands were considered too worthless for white man's use. Today, those Osage Indians have greater yearly revenues to the family from oil wells than the salary paid a senator of the United States; and to the credit of "the great white father" let it be said that the government of the United States has left them in possession of their lands and administers the revenues from the oil drillers so that the Indian gets his lawful share of the wealth.

The Rainbow of the Future

The beaver, the free lands, the mines, forests, cotton, factories, and oil—the yellow-green band—there is the rainbow belting East to West, making life easier, freer, happier for all the sons and daughters of all the races of men who came to this new land seeking opportunity and freedom to bring out the best that was in them. The rainbow that Noah saw augured hope and promise that the earth would not fail to produce food and shelter and clothing for all time for those who dwelt thereon. So does the rainbow of these seven bands, across the New Republic of the United States.

Back in the 17th century when the first settlers began moving up the rivers from the Atlantic coast, it took a three months' trip by canoe or woodland trail to get across the Alleghenies and the Blue Ridge and the Great Smokies and the Cumberland Ridge. And when the pioneers began going up the Platte and the Missouri from St. Louis between 1789 and 1820, along what later became known as the Oregon Trail, by flat-bottom boat and packhorse and wagon, 2,700 or 2,800 miles to the Columbia, it was considered

FROM COVERED WAGON TO AIRPLANE IN A LIFETIME



Many of the small boys and girls who crossed the plains in prairie schooners in a long three months' journey now to see the whizzing airplane make the trip in a few hours. In the lifetime of no other generation has so striking a change in the conditions of living taken place. The United States began the 19th century as a nation still in the pioneer stage, far behind most of the nations of Europe in science, art, and industry. A century later the children of the pioneers were masters of a mechanical age which had far outstripped all others in supplying the material wants of life. In the fresh field of the United States, the new has not had to combat the dead clutch of the old. Because of his nature and his history, the American trains his mind upon the future.

almost a miracle to cross to the Pacific one year and come back the next. When the steel path of the railroad first crossed the continent it was thought that the limit had been reached, that men would never cross the continent in less than 12 days; but the little steel paths began taking short cuts, bridging rivers, avoiding detours round rocky mountain ledges by tunnels, cutting across shallow lakes to avoid going round them, and the time decreased to less than five days from ocean to ocean. It was as if the rainbow had been belted across its diameter at the base by steel girders.

But today even greater miracles are accomplished. Winged ships roar through the skies three times as fast as a train. The airplane can travel so fast and so straight, high over obstacles, that it can—and does—cross the country from Atlantic to Pacific in less than a day. And those who stay at home can use the world's greatest web of telephone and telegraph lines to talk or send messages to almost anyone anywhere in the land.

Now, what heritage of farms, factories, homes, and opportunities did these busy pioneers and settlers leave to us who live today?

Our Country Today

Suppose we hire an airplane and a pilot to show the United States to an alert-minded young lad who has never traveled before. As they start from New York City they see below a tremendous sight. Here men have built straight up into the air instead of spreading out. The buildings rise four to seven times higher than Niagara Falls. In and out of the city hurry trains like swift shuttles; and dashing through the canyons of the narrow city streets are so many thousands of automobiles that our young traveler can't begin to count them all. And beneath the surface, he learns, are more trains, bearing hundreds of thousands on their errands about the city. It is like a tremendous heart, sitting there at the mouth of the Hudson, drawing millions of people every morning into the working districts, using them to dispatch a goodly share of the nation's work, and sending them out at night to their homes in a district nearly a hundred miles across from east to west.

And then the harbor! That is the most wonderful of all. Over the waters glide the ships, going and coming, like shuttles weaving strands of trade between the city and all parts of the world. There they are—lordly passenger vessels, like gigantic floating hotels, racing to and from Europe, South America, and the ports of the Pacific, freight vessels, large and small, and here and there a sailing vessel spreads its wings to the wind, with its cargo of coal, lumber, or other bulky stuff. (See Ships.)

There is another kind of vessel, too, not like the merchant ships, under the Stars and Stripes—great gray low-lying fellows with gun turrets. These are the ships of Uncle Sam's navy, and the little passenger is told that the American navy has as many battleships as any nation in the world. (See Navy.)

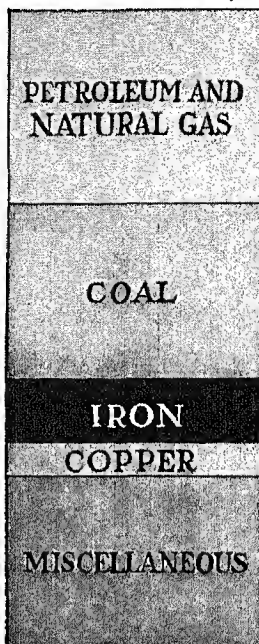
Then as the airplane speeds up the Hudson and along the Mohawk, the young traveler sees many other

beehive cities, crowded with people of all races, hurrying, hurrying, with the shuttle trains dashing in and out. The pilot explains to him that cities are nothing but big trading and manufacturing marts where men come to barter something they have for something they haven't, or to turn raw material into manufactured goods. Afterwards, when the air trip carries him above Boston and Buffalo and Pittsburgh and Cleveland and Youngstown and Chicago and St. Paul, Minneapolis, and Seattle and San Francisco and St. Louis and Kansas City and Omaha and New Orleans and Birmingham and Mobile and Savannah and Charleston and Baltimore and Philadelphia, he sees in every case that this is the explanation of the crowded city. In Massachusetts, the cities are making shoes and woolen and cotton goods. In New York and New Jersey they are making clothing and ships and shoes and leather and silks and sugar and chemicals. In Delaware and Rhode Island and Pennsylvania, they are making leather and woolen and cotton goods, steel and machinery

and chemicals. In the South, they are making cotton cloth and tobacco products and sugar, cottonseed oil and feeds for stock, and fertilizer for farms, and steel. In the Middle West, they are making leather and farm machinery; they are packing pork and beef, refining petroleum, and grinding flour. On the Pacific coast, they are making lumber, canning fruit and fish, building ships and airplanes, and making motion pictures.

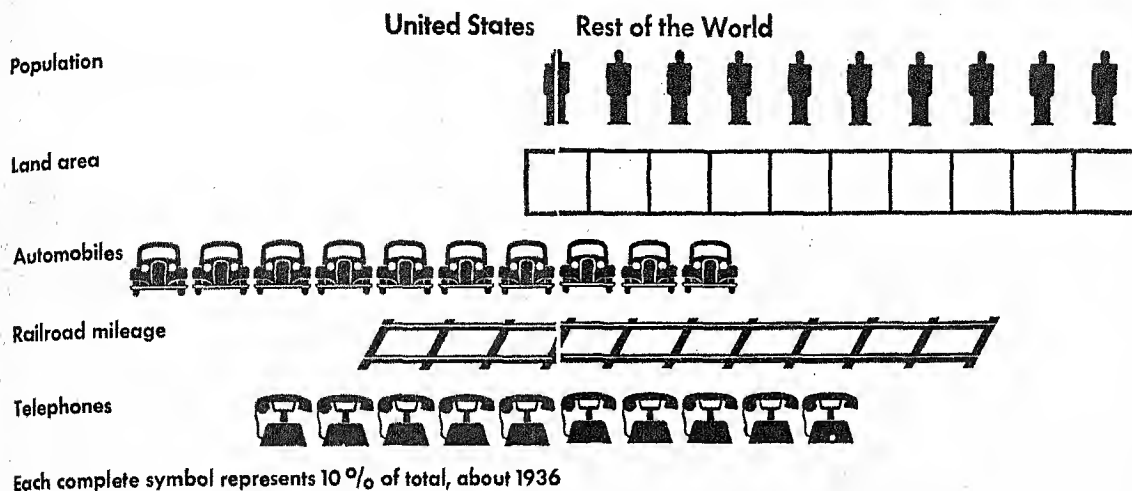
By the time the pilot has explained all this, the traveler has passed over Buffalo and Cleveland, those immense exchange marts, where the big boats of the Lakes exchange cargoes of grain and iron ore for cargoes of steel and coal and manufactured goods. Here is a ship with 300,000 bushels of grain, the grain from 10,000 acres, pouring its golden flood into chutes of great elevators that later pour it into flour mills or into boxcars for shipment to Europe.

There is no time to stop at Detroit, but he can see below the largest motor factories in the world—converted during the second World War to the production of war materials, but able to turn out thousands of cars a day after the war. Who will use all these cars? The traveler discovers as soon as he is above the great plains of the Mississippi. Here are 50,000,000 people needing motors for country roads

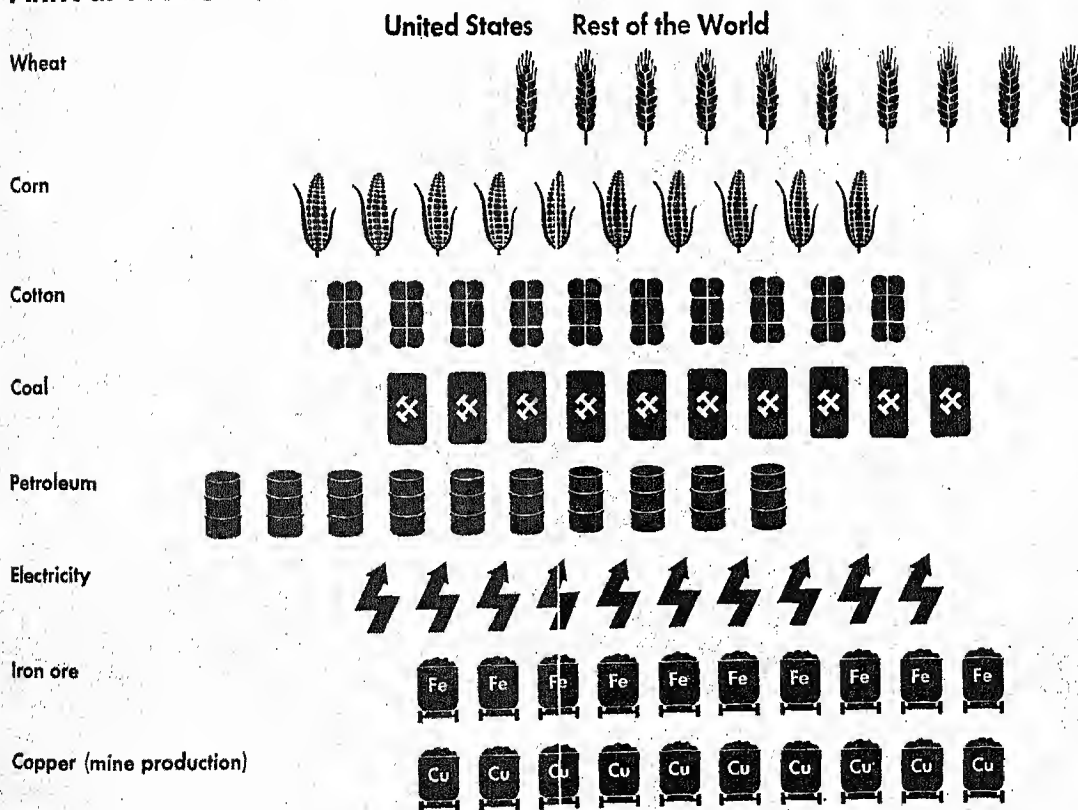


The relative value of the minerals produced in the United States.

United States and the Rest of the World



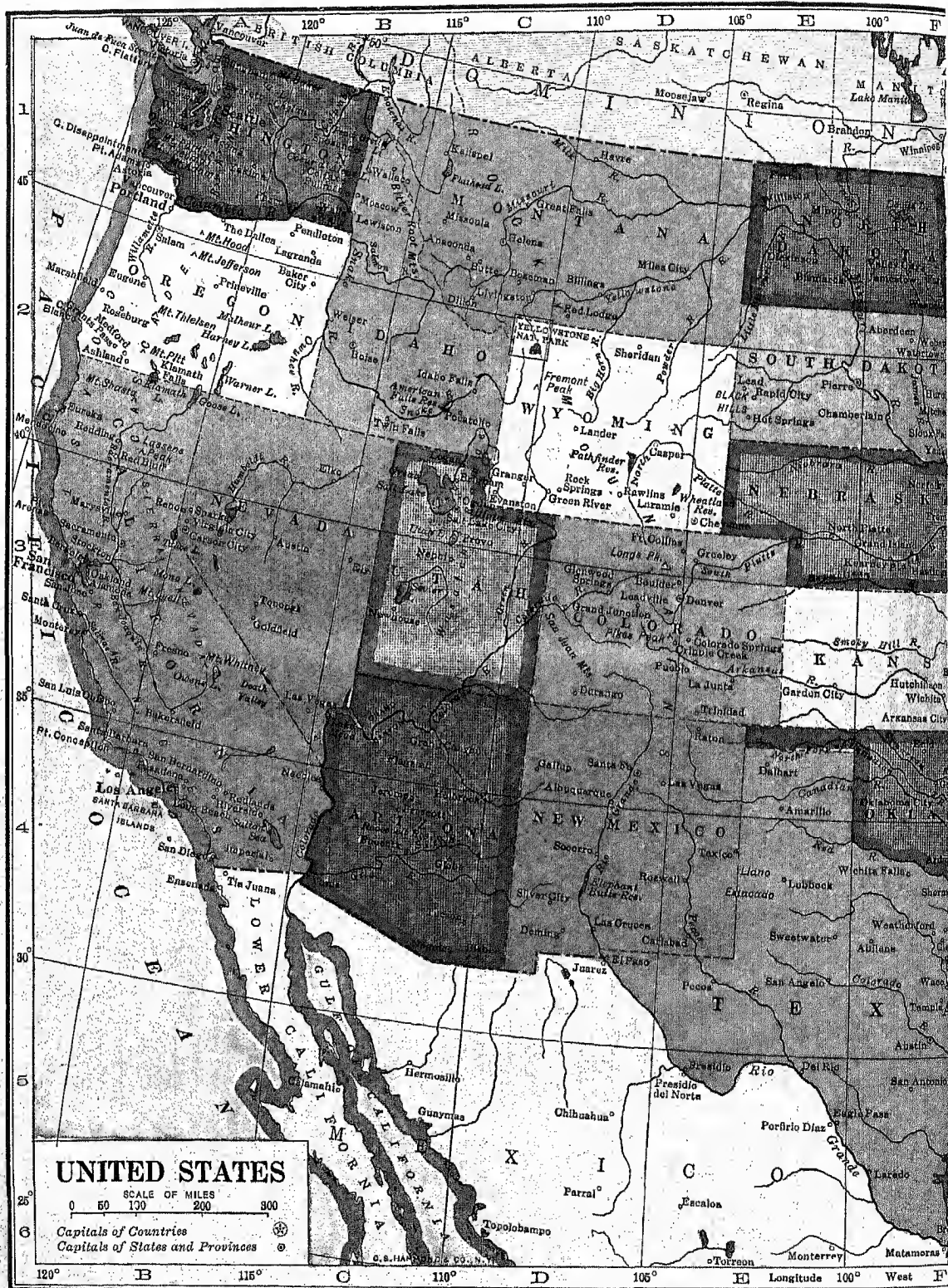
Annual Production

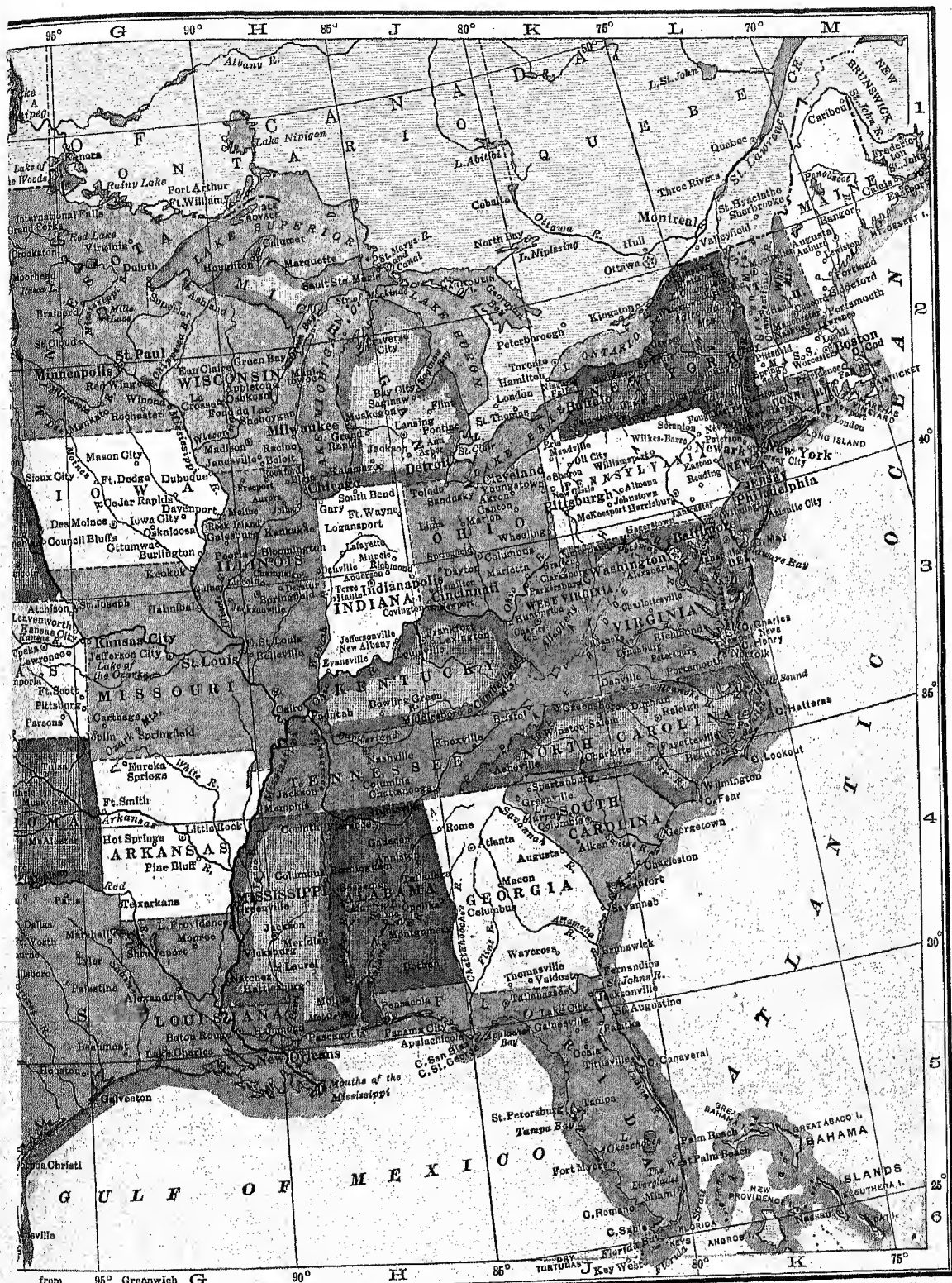


Each complete symbol represents 10 % of world production, average 1934-1936

Prepared for Compton's
Pictured Encyclopedia
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Though the United States includes only one-twentieth of the world's area and one-twentieth of the people, it has about two-thirds of the automobiles, one-third of the railroad mileage, and half of the telephones. The nation's high standard of living is reflected in the high percentage of such luxuries as automobiles and telephones. The lower chart shows that the United States produces a considerable proportion of the world's basic crops, essential minerals, and electric power. High production of iron, fuel, and power suggests the nation's industrial prominence. Other charts in the article *Mines and Mining* show production and consumption of other important industrial minerals. (Data from 'Statistical Year-Book of the League of Nations'.)

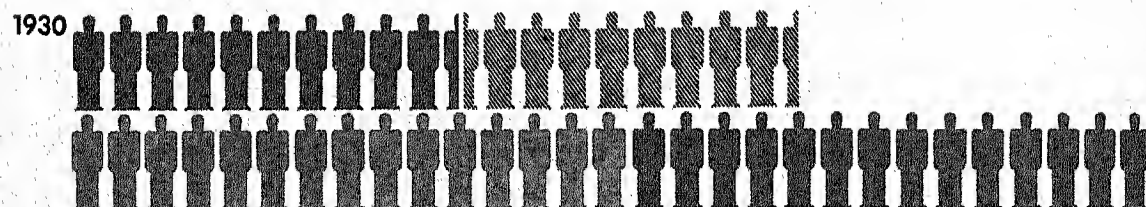
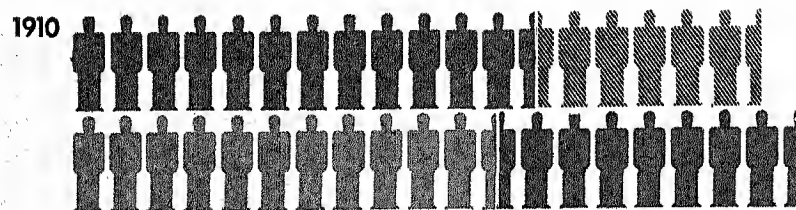
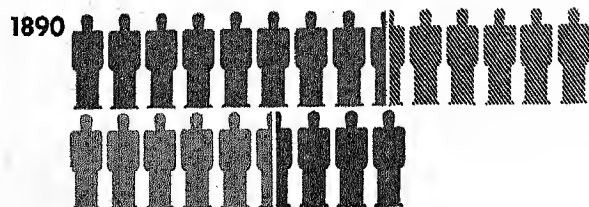




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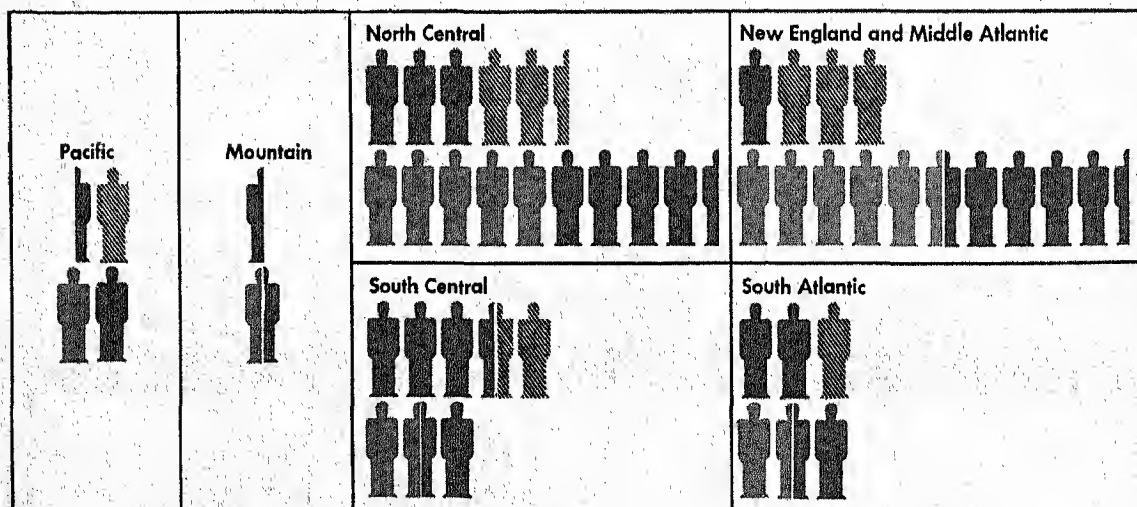
Occupations in the United States

Changes in Occupations 1890-1930



Each complete symbol represents 1 million gainfully occupied

Occupations by Sections in 1930



Each complete symbol represents 1 million gainfully occupied

Prepared for Campton's Pictured Encyclopedia
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green: agriculture, lumbering, fishing
gray: service

red: manufacturing, mechanical pursuits, mining
blue: transportation, trade, clerical work

In the 40 years from 1890 to 1930 the number of workers in United States industry caught up with and far surpassed the number in agriculture. The manufacturing group nearly tripled, while changes were slight in the agricultural group. With industrial development and growing population, the number of workers in trade and transportation jumped 400 per cent and the service workers steadily increased. The lower chart shows the distribution of occupations in the various sections of the country.

and city boulevards, trucks for hauling, tractors for farms. He knows now what made Chicago one of the world's great cities. It is where long lines of steel rails bring the trains rushing across the prairie with the beef and the hogs for the great meat-packing plants. It is where fleets of giant freighters come to discharge their cargoes of iron ore and lumber from the North. It is the great mart for the farmer, who sells, and the manufacturer, who buys.

And when he sees the farm lands of the great Mississippi valley, our young friend's head swims with wonder at their enormous extent. He isn't afraid of those immense cities going hungry, at least for a long time, even though the city beehives continue to grow larger and higher year after year.

Across the Valley of Golden Fields

While he gazes at the vast carpet of wheat fields, golden ripe in the sunshine, the pilot tells him that in the troubled days of the World War, these fields grew more than a billion bushels of wheat in one year, or nearly twice the amount the country normally eats in a year. More than 60 million acres, or nearly 94,000 square miles, of land were used to produce this flood of food; the same can be done again, whenever the country may have need. Even in years of small demand, there are more than 40 million acres of wheat.

But even such a sea of wheat land does not compare with the land devoted to corn. In almost any year, our young flyer would see more than 100 million acres bearing the tasseled plants of the country's leading grain—an area nearly as great as all New England with New York and Pennsylvania thrown in. The crop has exceeded three billion bushels in a year; this is more than two-thirds of a ton of corn for every man, woman, and child in the land.

What becomes of all this corn? The pilot points to long trains threading the landscape, with animals traveling to Chicago, Omaha, Kansas City, and other centers, there to be transformed in a twinkling into beef, veal, pork, lamb, and mutton. These animals are, you might say, corn going to market on four legs. How many go to market in a year? The country's farms have furnished in one year more than 20 million cattle and calves, 60½ million hogs, and 18 million sheep, for food. Added together, these would make almost one food animal for every person in the nation.

Other corn and grass eaters provide milk; in years of large demand they have produced nearly 100 gallons for every person in the United States. And chickens, 600 million of them, that lay as many as 33 billion eggs a year!

We have learned all too well that, even with such abundance, city folk can go hungry, while farmers cannot sell their crops; but this is no fault of the land. Scarcities are man's doings; our young traveler has seen that the land can feed everyone royally.

Before flying to the Pacific coast, the pilot makes a great swing down the Mississippi and far to each side of the river, so that they can see the great cotton plantations which supply the material for so much of

our clothing. Below them lie the fields that often have met over half the world's demand for cotton. These fields, the pilot says, cover from 28½ million acres to nearly 46 million acres—an area greater than all the New England states. Yields run from about 10 million to nearly 18 million bales—more than one-eighth of a bale for everyone in the land.

Adding together the value of all the crops and animals produced on all the farms our travelers have seen—and many more that they have not seen—gives us the stupendous total of 12 billion dollars, in a prosperous year—half as much as all the gold produced since Columbus discovered America! Our travelers can understand now why the farm is more important than all the gold and silver mines in the world.

Now they would like to cross the Pacific and visit Hawaii, with its pineapple and sugar plantations, and the important naval and air bases of Guam and Samoa; but the pilot says that he would rather not take the time, although great clipper ships now span the ocean. And instead of flying to Alaska, our adventurers content themselves with hearing about its rich gold and copper mines, its salmon and fur-seal fisheries, its fertile valleys, and its glorious mountains, glaciers, and active volcanoes.

They decide to come back from the Pacific by way of the Canal Zone. Though that is one of Uncle Sam's narrowest bits of territory, it is one of his most valuable; for it connects the two great oceans by a cut straight through the mountains. (See Panama Canal.)

The Ships that Cross the Continent

What interests the flyers here is not so much the great cut of the Canal across the Isthmus, as the ships loaded with iron ore and nuts and sugar and hemp and nitrates and lumber and oil and coffee and pineapples and spices and coconuts going to the Atlantic, and the ships loaded with machinery and clothing and other manufactures going to the Pacific. At each end of the Canal glide the great low-lying gray war-vessels guarding the passage from attack—"patrolling the zone" they call it; and here are the most wonderful tall steel towers of coal and tanks of oil he has ever seen. They are like the grain elevators of Buffalo and Chicago and Minneapolis—700,000 tons of coal they keep on hand; and here is coal being run down into the holds of the great ships at the rate of 1,500 tons an hour. The great oil tanks can store 2,500,000 barrels of oil.

Again the pilot decides that it is too long a "jump" to visit America's island possessions in the West Indies. While they are lunching, however, he tells his passenger about the beautiful green Virgin Islands with the harbor at Charlotte Amalie standing like a sentinel at the eastern approach to the Panama Canal. Close by is Porto Rico with its sugar and tobacco and coffee fields, and with more than a million and a half industrious people. (See Porto Rico; Virgin Islands.)

As they are flying home up the Gulf to the great cotton wharves and warehouses of New Orleans, the boy tries to understand why so many classes of people can

IMPORTANT FACTS ABOUT EVERY STATE IN THE UNION

STATE	TOTAL AREA, SQUARE MILES	RANK IN AREA*	POPULATION (1940 CENSUS)	RANK IN POPULATION	CAPITAL	DATE OF ADMISSION
Alabama.....	51,609	28	2,832,961	17	Montgomery	Dec. 14, 1819
Arizona.....	113,909	5	499,261	43	Phoenix	Feb. 14, 1912
Arkansas.....	53,102	26	1,949,387	24	Little Rock	June 15, 1836
California.....	158,693	2	6,907,387	5	Sacramento	Sept. 9, 1850
Colorado.....	104,247	7	1,123,296	33	Denver	Aug. 1, 1876
Connecticut.....	5,009	46	1,709,242	31	Hartford	Jan. 9, 1788†
Delaware.....	2,057	47	266,505	46	Dover	Dec. 7, 1787†
Florida.....	58,560	21	1,897,414	27	Tallahassee	Mar. 3, 1845
Georgia.....	58,876	20	3,123,723	14	Atlanta	Jan. 2, 1788†
Idaho.....	83,557	12	524,873	42	Boise	July 3, 1890
Illinois.....	56,400	23(22)	7,897,241	3	Springfield	Dec. 3, 1818
Indiana.....	36,291	37(37)	3,427,796	12	Indianapolis	Dec. 11, 1816
Iowa.....	56,280	24	2,538,268	20	Des Moines	Dec. 28, 1846
Kansas.....	82,276	13	1,801,028	29	Topeka	Jan. 29, 1861
Kentucky.....	40,395	36	2,845,627	16	Frankfort	June 1, 1792
Louisiana.....	48,523	30	2,363,880	21	Baton Rouge	Apr. 30, 1812
Maine.....	33,215	38	847,226	35	Augusta	Mar. 15, 1820
Maryland.....	10,577	41	1,821,244	28	Annapolis	Apr. 28, 1788†
Massachusetts.....	8,257	44	4,316,721	8	Boston	Feb. 6, 1788†
Michigan.....	58,216	22(10)	5,256,106	7	Lansing	Jan. 26, 1837
Minnesota.....	84,068	11(11)	2,792,300	18	St. Paul	May 11, 1858
Mississippi.....	47,716	31	2,183,796	23	Jackson	Dec. 10, 1817
Missouri.....	69,674	18	3,784,664	10	Jefferson City	Aug. 10, 1821
Montana.....	147,138	3	559,456	39	Helena	Nov. 8, 1889
Nebraska.....	77,237	14	1,315,834	32	Lincoln	Mar. 1, 1867
Nevada.....	110,540	6	110,247	48	Carson City	Oct. 31, 1864
New Hampshire.....	9,304	43	491,524	44	Concord	June 21, 1788†
New Jersey.....	7,836	45	4,160,165	9	Trenton	Dec. 18, 1787†
New Mexico.....	121,666	4	531,818	41	Santa Fe	Jan. 6, 1912
New York.....	49,576	29(26)	13,479,142	1	Albany	July 26, 1788†
North Carolina.....	52,712	27	3,571,623	11	Raleigh	Nov. 21, 1789†
North Dakota.....	70,665	16	641,935	38	Bismarck	Nov. 2, 1889
Ohio.....	41,222	34(33)	6,907,612	4	Columbus	Feb. 19, 1803
Oklahoma.....	69,919	17	2,336,434	22	Oklahoma City	Nov. 16, 1907
Oregon.....	96,981	9	1,089,684	34	Salem	Feb. 14, 1859
Pennsylvania.....	45,333	32(32)	9,900,180	2	Harrisburg	Dec. 12, 1787†
Rhode Island.....	1,214	48	713,346	36	Providence	May 29, 1790†
South Carolina.....	31,055	39	1,899,804	26	Columbia	May 23, 1788†
South Dakota.....	77,047	15	642,961	37	Pierre	Nov. 2, 1889
Tennessee.....	42,246	33	2,915,841	15	Nashville	June 1, 1796
Texas.....	267,339	1	6,414,824	6	Austin	Dec. 29, 1845
Utah.....	84,916	10	550,310	40	Salt Lake City	Jan. 4, 1896
Vermont.....	9,609	42	359,231	45	Montpelier	Mar. 4, 1791
Virginia.....	40,815	35	2,677,773	19	Richmond	June 26, 1788†
Washington.....	68,192	19	1,736,191	30	Olympia	Nov. 11, 1889
West Virginia.....	24,181	40	1,901,974	25	Charleston	June 20, 1863
Wisconsin.....	56,154	25(20)	3,137,587	13	Madison	May 29, 1848
Wyoming.....	97,914	8	250,742	47	Cheyenne	July 10, 1890

Areas are total land and inland water, not including Great Lakes and coastal areas under state jurisdiction. The Great Lakes area is divided as follows: Illinois, 1,526 sq. mi.; Indiana, 228 sq. mi.; Michigan, 38,575 sq. mi.; Minnesota, 2,212 sq. mi.; New York, 3,627 sq. mi.; Ohio, 3,457 sq. mi.; Pennsylvania, 735 sq. mi.; Wisconsin, 10,062 sq. mi.

*Figures in parentheses show rank when Great Lakes area is included.

†Original state. This is date on which it ratified the Constitution.

get along so well together. Though their forebears came from every national and racial stock of Europe, with other millions from Africa, they all live as a rule in peace and harmony. What is the common bond among people of such diverse origin? And what is it in this New World that enables these Americans to live at peace with their Canadian neighbors along 3,000 miles of unguarded border?

The answer perhaps is—because it is a New World. These people came to escape Europe's quarrels and to build a society in which life, liberty, and the pursuit of happiness should be everyone's birthright. In such a society there is no room for intolerance and

no need to make war upon neighbors. (See Immigration; also 'Our American Heritage', page U-256a.)

The Climate Is Favorable

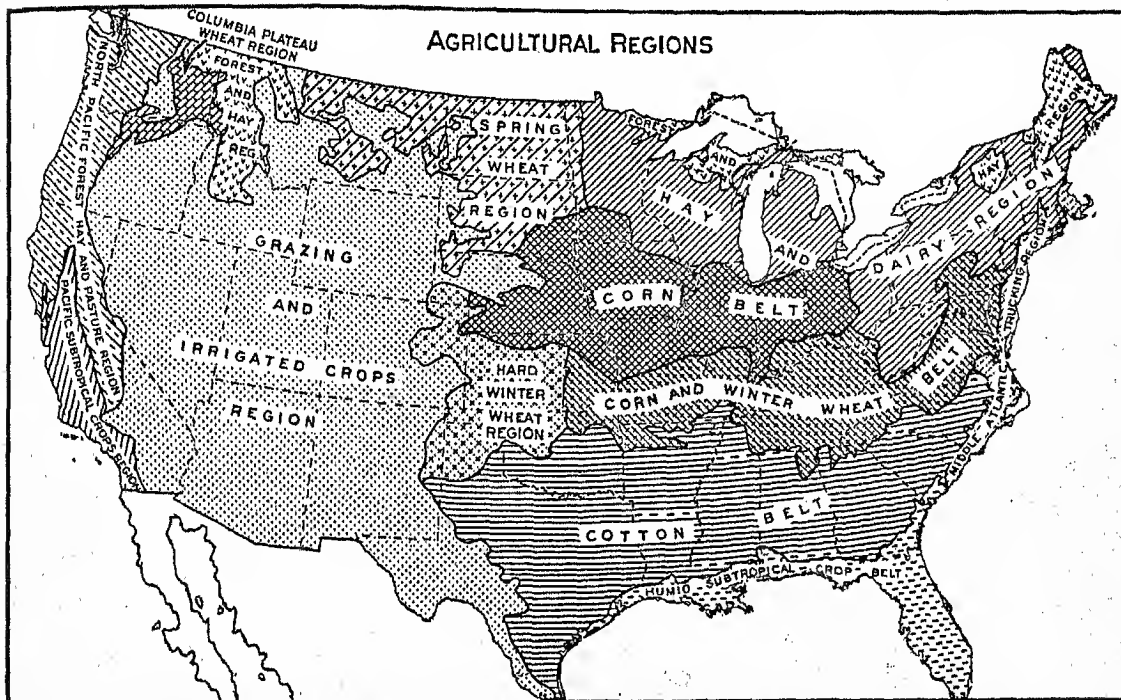
One reason why the United States enjoys the abundance we have been viewing is that its mainly continental climate, with constant changes in weather, is of the type most favorable to human activity (see Climate). Minnesota, for example, has had temperatures ranging from more than 40° below zero to more than 100° above. Similar variations occur throughout the vast central valley which stretches between the two great mountain systems and thus presents a corridor to tropic heat and to Arctic cold.

A second controlling factor in determining the climate is the fact that the prevailing winds are westerly. The Pacific coast enjoys a mild and equable climate because of the moderating influence of the winds blowing from the Pacific Ocean, but the Atlantic coast suffers far greater extremes, because the winds coming from the interior of the continent are warm in summer and cold in winter. The great

agricultural wealth. It is thanks to them that agriculture is America's greatest industry from the standpoint of the number of persons engaged.

King Corn rules in the Central Plains. His dominion is the greatest farming section of the whole world, for King Corn is a benevolent monarch and generously shares his kingdom with others. Indeed, some of his vassals are greater than the rulers of other sections.

HOW AMERICA'S FARM AND FOREST WEALTH IS DISTRIBUTED



Latitude and temperature determine the farm products of the United States. Hay and dairy products are the main dependence in the East. Cotton and subtropical crops bring riches to the South. Corn and wheat thrive throughout the Central zone, and wheat well to the North. Grazing land, irrigated crops, and great forest wealth are found in the Far West and along the northern borders.

differences in rainfall between various parts of the country are also partly explained by the westerly direction of the winds, which deposit most of their moisture before crossing the mountain barrier. In the Northwest on the coast there are torrential rains, amounting to as much as 100 inches a year, but farther south the amount of rainfall rapidly lessens, especially in southern California. Inland the rainfall becomes extremely variable, ranging from less than 10 inches in most of the Great Basin to more than 30 inches in some favored localities of the Rockies. On the Great Plains the annual rainfall varies from about 15 to 25 inches. The eastern half of the United States is well watered, since it draws its moisture from the Atlantic Ocean, the Gulf of Mexico, and the Great Lakes, and also because there are no intervening ranges of high mountains to interfere with an even distribution. (For rainfall map see North America.)

The Kings That Rule the Great Republic

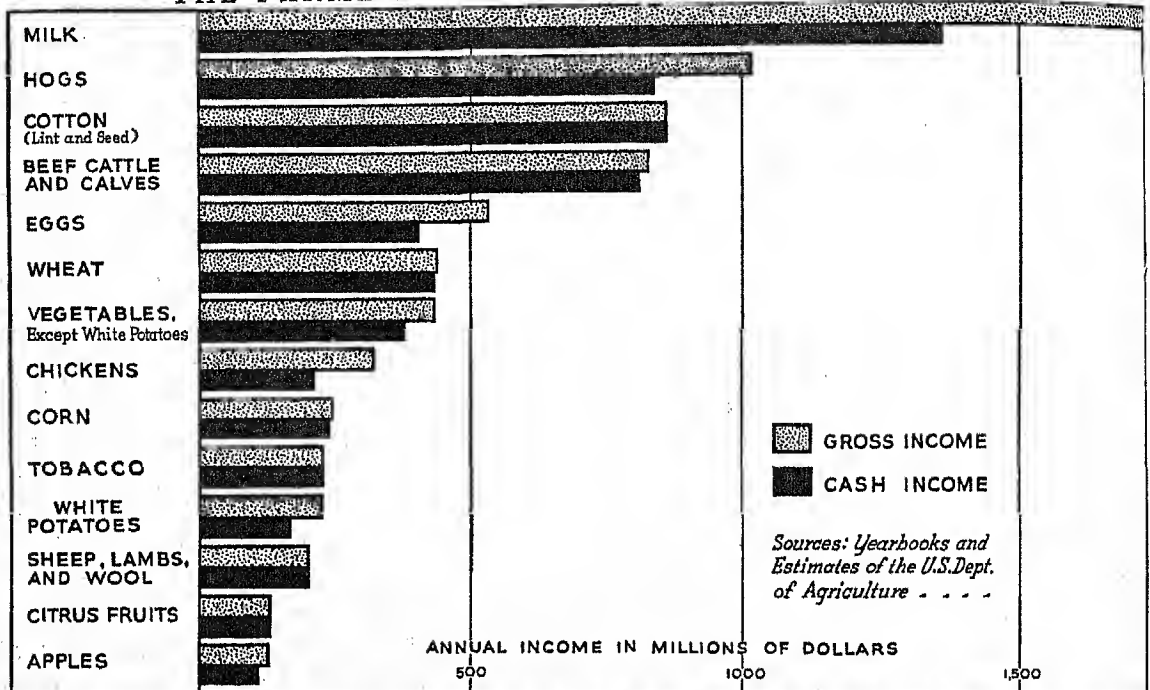
The well-watered Central Plains and the Atlantic and Gulf Coastal plains lead in the production of

This, for instance, is true of wheat, cattle, swine, oats, hay, butter, and eggs, all of which are produced in the Central Plains in greater quantities than elsewhere.

King Cotton rules in the South. His chief domain is in the "Cotton Belt," the world's greatest cotton-producing area. This extends from southeastern Virginia through North and South Carolina, Georgia, northern Florida, Alabama, Mississippi, Tennessee, Arkansas, Louisiana, Texas, Oklahoma, and southeastern Missouri. Here we find a long growing season, plenty of rain, and a moderately warm climate. King Cotton has been a rather despotic ruler in the past, grudgingly sharing his domain with rice, sugar, tobacco, corn, and cattle. The word has gone forth, however, from the leading citizens of the South that the farmers should diversify their crops more largely. King Cotton is in no danger of being overthrown, but he must shortly find King Corn beside him.

On the Great Plains, King Wheat holds sway. He, too, is not wholly benevolent, for he is a soil robber. Too much successive cropping in wheat impoverishes

THE FARMER'S LEADING INCOME PRODUCERS



Here are shown the cash and gross incomes from agricultural products which usually bring in one hundred million dollars or more a year. Gross income is cash income from products the farmer sells plus the value of the products used in farm households; the figures are an average for the period 1928-37. Each of these values is less than the farm value of the product, because farm value includes the crops fed to stock and used as seed, and animals held over for the following year. For example, corn is the most valuable crop; but much of the corn is fed to stock, and only the relatively small amount shown is sold or used in farm homes. Note also that home use, as shown by the difference between cash and gross income, varies considerably with different products.

the soil, and so farmers on the Great Plains are urged to diversify crops and raise more livestock. The United States Department of Agriculture has introduced non-saccharine, drought-resisting sorghums from Africa. Among these, milo maize and kafir have become staple crops. Wheat, however, will hardly be displaced, because it is especially well adapted to this region. In the southern half, strains of hard red winter wheat, which came originally from the dry steppes of Russia, yield fine crops with a minimum of moisture. Marquis and other hard spring wheats do well in the north.

Western Livestock, Irrigation, and Fruit

Throughout most of the Cordilleran region, with the exception of the Pacific coast, King Cattle rules. In the early days his sway was undisputed, but later a powerful rival, sheep, took over part of his domain. Indeed, more sheep are raised today in the Cordilleras than in all the rest of the United States.

Much former cattle land has also been turned into farms and orchards by irrigation. The government irrigation projects alone have reclaimed about 3,000,000 acres. The soils are rich because essential minerals have not been leached out by rainfall, and these lands produce crops worth more than \$100,000,000 a year.

Wheat has found an especially favorable region in the Columbia River Plateau. Here is a practically inexhaustible soil, 30 feet, 40 feet, or even 100 feet deep, composed of ancient lava and volcanic ash. An

especially choice variety of long-staple cotton has been established on irrigated lands along the Gila and Salt rivers in southwestern Arizona.

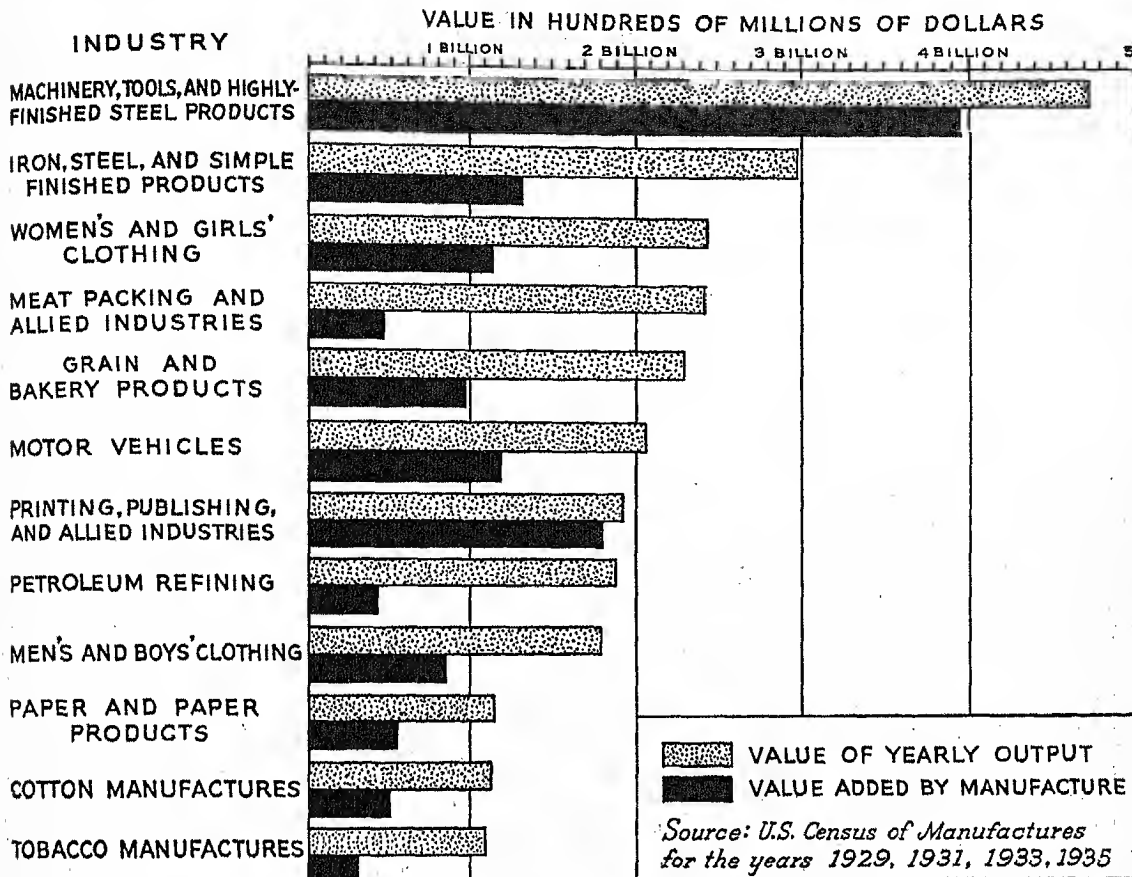
On the Pacific coast King Fruit has his golden throne. He is represented in the north chiefly by the apples of Oregon and Washington, and in southern California by oranges and lemons. Between these regions are grapes, raisin grapes, and the prune plum. The Pacific coast is, however, by no means the only leading region for fruit. Important rivals are Florida with its oranges and grapefruit, western Michigan with its peach and apple belts, Lake Erie's southeastern shore with its grapes, and Texas and Arizona with their citrus fruits. New England, the Atlantic Coast Plain, and parts of Arkansas also grow fruit.

How Uncle Sam's Lands Are Used

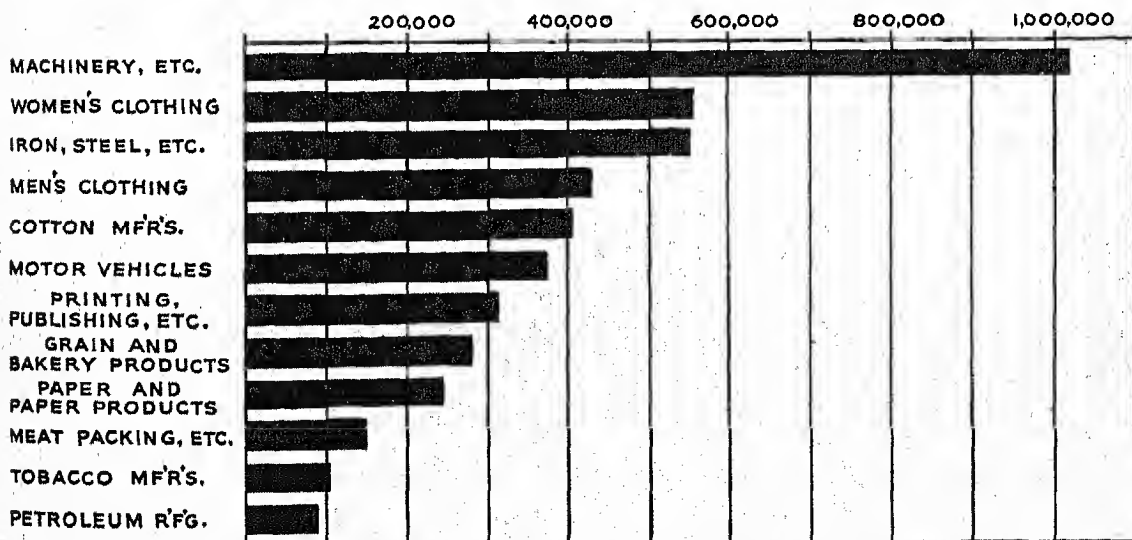
When the area of small lakes and rivers is subtracted from the total area of the United States, the remaining dry land amounts to 2,977,128 square miles. Of this amount more than half is contained in farms. The exact amount varies from year to year, but it remains near 1,600,000 square miles. A little less than 650,000 square miles of the farm land is usually used for crops; the rest is made up of pasture, woodland, waste land, and land used for homes. More than 900,000 additional square miles are used for grazing cattle and sheep; the rest of the land area is unused forest, mountain, or desert, or is in use for cities, parks, roads, railroads, and factories. Iowa leads

BILLION-DOLLAR INDUSTRIES OF THE NATION

VALUE OF ANNUAL OUTPUT AND VALUE ADDED BY MANUFACTURE



AVERAGE NUMBER EMPLOYED IN LEADING MANUFACTURES



These graphs show significant facts about the industries which produce goods valued at more than a billion dollars a year. The figures are averaged for the period 1928-35, in order to use a fair number of both good and bad years. The upper graph shows the value of finished products at factory prices and also the portion of this value which is added to the value of raw materials by manu-

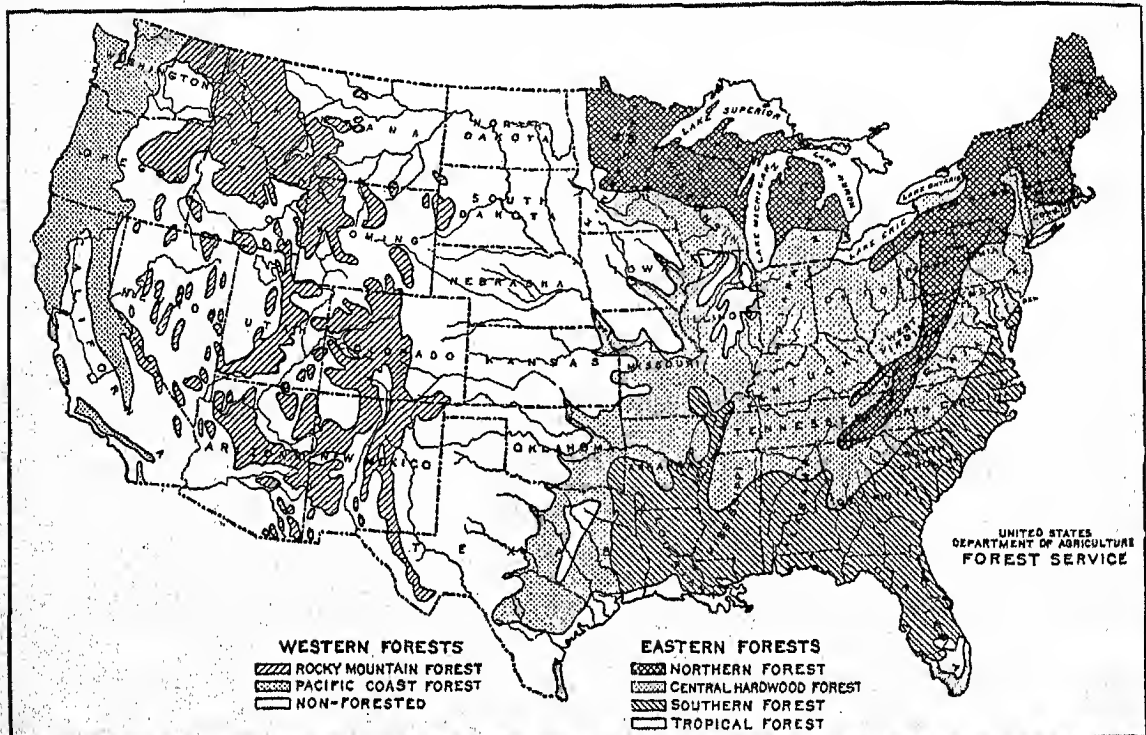
facture. The lower graph shows the average number of workers employed in each industry. Related industries, which are shown separately in census publications, have been combined, notably in the metal and clothing industries. Allowances have also been made for the census practice of counting the value of raw materials more than once as goods move from plant to plant in manufacture.

as a farming state, with nearly 95 per cent of its area in farms. (See Agriculture; Corn; Cotton; Dairying; Poultry; Wheat, etc.)

The forest lands of the United States occupy about 630,000,000 acres—an area considerably larger than that of all the crop lands. The evergreen forests are in the northern Appalachian Highlands, the Cordilleran system, northern Michigan, Wisconsin, and

articles on the chief minerals). Coal is widely distributed and is mined in 30 states. The principal fields are the anthracite region in Pennsylvania, the high-grade bituminous coals throughout the southern Appalachian Highlands and under much of the Central Plains, the low-grade bituminous coals scattered in the Rockies, and the lignites in the South and in eastern Montana and western North Dakota. The United States has

FOREST REGIONS OF THE UNITED STATES



This map shows the natural forest regions of the United States with a total acreage of 630,000,000, including forest lands of all kinds, timbered, cut-over, and burned. If this acreage can be kept steadily at work raising trees, it will take care of the domestic needs for lumber and will allow a surplus for export. Careless lumbering and destructive fires, however, cause great waste, with the result that over 80,000,000 acres, which are more suitable for growing trees than for any other purpose, are now lying idle. A well-developed national program of reforestation is needed if the forests are to endure.

Minnesota, and the South Atlantic and Gulf Coastal plains; the hardwood forests are mainly between the Atlantic Ocean and the Mississippi River. The chief supply of timber now comes from the Southern forests, where about 11,000,000,000 feet of the Southern yellow pine are cut yearly. Next comes the Northwest, where more than 8,000,000,000 feet of Douglas fir are cut each year. Other important evergreen woods, furnishing timber, chiefly for building, are white pine, Western yellow pine, and hemlock, of each of which more than a billion feet are cut every year. Most of the valuable hardwoods have become quite rare. Oak, the chief remaining one, furnishes only about 2,000,000,000 feet a year. To protect the remaining timber stand great national forest reserves have been established. (See Conservation; Forests and Forest Protection.)

In mineral resources the United States is the most richly endowed region in the world (see Minerals; also

50 per cent of the world's visible future coal supply and produces about one-third of the present supply.

In oil and gas, which now exceed coal in total annual value, the United States again leads, producing about three-fifths of the world's output of oil. When the oil wells are exhausted—their average life is about 30 years—the United States can then turn to its enormous supply of oil shales, from which oil can be extracted. In the production of iron, the most useful of all metals, the United States is also first. The best field is that around Lake Superior in northern Michigan and Minnesota, and that of next importance in the southern Appalachians, especially in northern Alabama. Many of the fields lie close at hand to important coal areas.

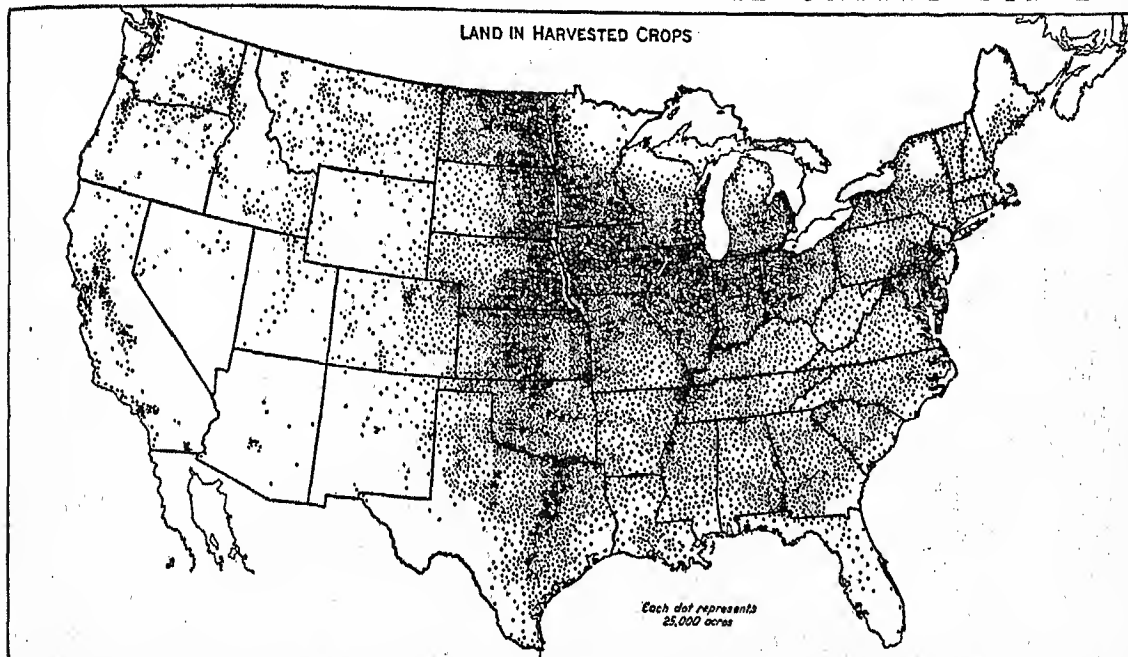
Gold, Silver, Copper, Lead, and Zinc

Three states of the Union, Arizona, Montana, and Utah, produce about one-fourth of the world's supply of copper. Michigan is also an important copper pro-

ducer, being famous for its deposits of native metal. The United States ranks second in silver and third in gold. Gold occurs in the southern Appalachians, but is chiefly found in the Cordilleras. An important field is the Black Hills. Silver is also found throughout the Cordilleran system, frequently in connection with lead and copper ores. California, South Dakota, Colorado, Utah, Arizona, and Nevada lead in gold,

But immense as is the wealth in raw materials with which nature has endowed the United States, it has to yield to the value of the products which human ingenuity and skill manufacture from these raw materials. The total value of the products of farms, mines, forests, and fisheries averages about one-third the value of the manufactured products, which form about 75 per cent of the country's total production. The

THE GREAT FARMING AREAS OF THE UNITED STATES



This map shows you at a glance that agriculture in the United States is concentrated in the rich Mississippi Valley. If you draw a triangle, extending from the middle of North Dakota's northern boundary to the southern point of Texas, and from there to western Pennsylvania, you will inclose a territory which produces four-fifths of the corn, three-fourths of the wheat and oats, and three-fifths of the hay crop of the country. Probably no other territory in the world, of such a vast size, affords so favorable natural conditions for the growth of these crops.

while Montana, Utah, Idaho, Nevada, Arizona, and Colorado lead in silver. The most important lead field is in the Ozark Plateau, and Oklahoma and Kansas are the most important sources of zinc. Building materials are widely distributed. Clay for brick and pottery is found in every state. Limestones and granites come chiefly from the Appalachian states, although the most valuable are found in Indiana. Slates come chiefly from Pennsylvania and New York, and marble chiefly from Vermont.

In nature's third great gift, fish and other sea food, the United States ranks second to Japan in the value of its yearly catch. The fish best adapted for the food of man are found in the cooler waters; consequently the chief fishing grounds are north of the Carolinas on the Atlantic (haddock, cod, mackerel, and herring), north of San Francisco on the Pacific (salmon and halibut), and in the Great Lakes (whitefish, lake herring, lake trout). Oysters, the most valuable fisheries product after salmon, come chiefly from Chesapeake and Delaware bays and Long Island Sound. The best lobster fisheries are off the coast of Maine.

manufacturing industries which usually turn out goods valued at a billion dollars a year or more are shown in a graph on page 193. If smaller allied industries are added to these leaders to form natural groups, the food industries will be found to produce about nine billion dollars' worth of products in an average year. Textiles come next, with perhaps two-thirds as much.

After these giant groups come transportation equipment for land, sea, and air, iron and steel in simple forms, machinery, chemicals and allied products, petroleum and coal products, printed and published material, products from metals other than iron, forest products, paper and paper products, and leather products. These rankings show, first of all, the high importance of food and clothing, two of mankind's greatest needs. Then comes the tremendous use of transportation, machinery, metals, and chemicals.

Where Manufacturing Is Centered

About three-fifths of all manufactures are made in the Middle Atlantic and North Central states. This is one of the greatest manufacturing centers in the

world, because it has, to an exceptional degree, all the factors that are required for economic production. It has coal, iron, clay, and stone; hard and soft woods; water power with rain well distributed throughout the year (and natural reservoirs, to maintain even river flows); rich agricultural lands to provide raw materials for the factories and food for the workers; unexcelled transportation by land and water. Furthermore, it is conveniently situated for supplying the world's chief markets.

The New South

The southern part of the United States has gone through a noteworthy transformation since 1880. The Old South was mightily favored by nature; it had rich resources and latent power. But it suffered from an agricultural system based on slave labor and on a single crop. Under this system, soil depletion and surface erosion did great damage. Fields were cropped until they could not produce more, and were then allowed to lie fallow. The Civil War ended slavery but not the one-crop system, and it remained for a tiny insect, the boll weevil (*see* Weevils) to end the despotism of King Cotton. Many sections of the South were so ravaged by these insects that the growing of cotton had to be abandoned. In its place came fruits, winter vegetables, nuts, dairy products, and cattle. The South now produces about one-third of all the farm produce of the country in value.

Mineral production and manufacturing have also increased rapidly in recent times. The South accounts for two-fifths of the value of the country's total mineral output. It produces two-fifths of the coal, a tenth or more of the iron ore, half of the petroleum and natural gas, and virtually all the sulphur, phosphate rock, and bauxite. Half the lumber of the country comes from the South. Enormous water-power resources, in addition to coal, are available to turn the wheels of the new factories. Great stands of yellow pine provide the raw material for a growing paper and pulp industry. Cotton and rayon mills, petroleum refineries, and plants for the manufacture of many kinds of chemicals turn natural resources into finished products.

Transportation and Trade

Hand in hand with the industrial expansion of the nation has gone the development of its railways and waterways. In railway mileage (more than 235,000), the United States leads the nations, and it has 30,000 miles of navigable waterways (*see* Canals; Great Lakes; Mississippi River; Railroads; Rivers and Inland Waterways). Over these avenues passes a flood of internal commerce greater than the internal commerce of France, Germany, and the United Kingdom together, and greater in value than the combined imports and exports of all the countries of Europe. In proportion to the population the internal trade of the United States is far greater than that of any other nation, because the standard of life is higher; Americans spend more for food, clothing, and the comforts and luxuries of life than any other people.

In foreign trade the United States ranks as one of the great factors of world commerce. Much of its trade is with its nearest neighbors, Canada, Mexico, the West Indies, and Central and South America. Nickel, printing paper, wood pulp and pulp wood, and wheat are imported from Canada; bananas and copper from Mexico; sugar and molasses from Cuba; tropical fruits, coffee, and cacao from Central America; coffee and crude rubber from Brazil; wool and hides from the Argentine; and copper from Peru and Chile. From the Orient come silks, rice, tea, tin, gums, fibers, and rubber. From Europe come chiefly manufactured articles. In return for these the United States exports a great variety of products.

Unmanufactured cotton alone accounts for from one-eighth to one-fourth of the exports by value. Petroleum and its products, machinery, automobile parts and accessories, and animals and animal products make up another quarter or more. Tobacco, chemicals and related products, iron and steel products, fruits, and wood products account for another quarter.

A Century of Growth

This mixed list of raw materials and manufactures reflects the developments achieved in a century of growth. While the pioneers were busy settling the land, they sent farm products and raw materials, such as wood products, abroad to pay for the manufactured goods they needed. Some of these exports, like cotton and tobacco, are still large; but when American mechanical genius found ways to make machinery and automobiles better than anyone else, these manufactures took a high place in the list of exports.

During its first century, the United States had to export more than it imported, so that the excess could pay for the money borrowed from abroad to build up home industries and commerce. But even after the first World War made the United States the leading creditor nation, instead of a debtor, the demand for American goods abroad preserved an export surplus. This surplus persisted even through the business depression of the 1930's, when nearly all export business in wheat and flour was lost and the total value of exports shrank to one-third of what it had been.

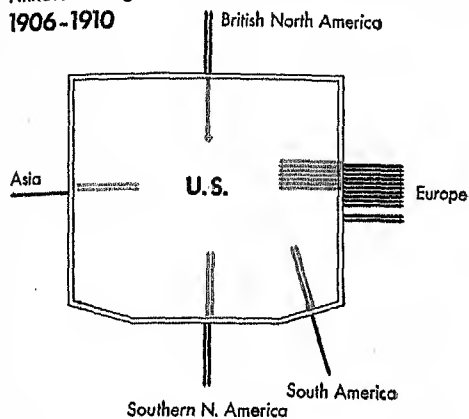
The Millions That Make Up the Nation

With its 131,669,275 people (besides its millions in Alaska and Hawaii and in the island possessions), the United States ranks fourth among the nations. Only China, India, and Russia have a larger population. It has as many people as all Latin America.

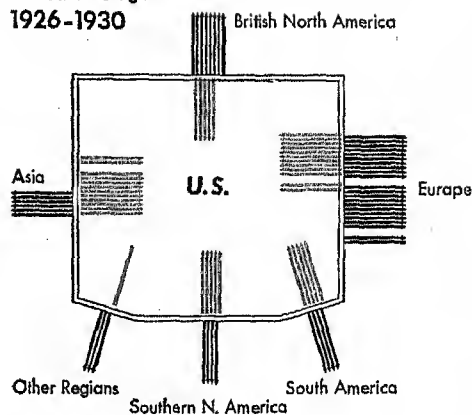
The North Central states have 30.5 per cent of the population; the Southern states, 28.4 per cent; and the Middle Atlantic states, 22.5 per cent. The average density of population at the 1940 census was 44.2 to the square mile. Rhode Island, New Jersey, and Massachusetts are the most densely populated states, with 674.2, 553.1, and 545.9, respectively, to the square mile. At the other extreme, Nevada has only about one for each square mile. The center of population in 1940 was fixed at a point two miles southeast of Carlisle, Sullivan County, Ind. In the decade

Where the United States Buys and Sells Goods

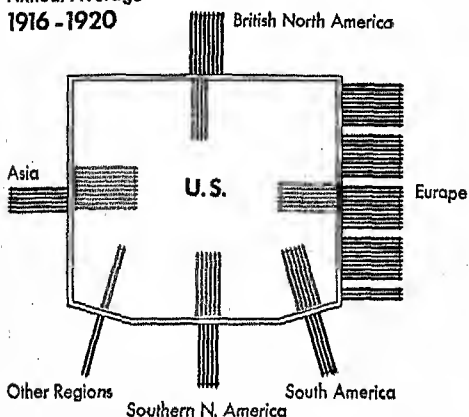
Annual Average
1906-1910



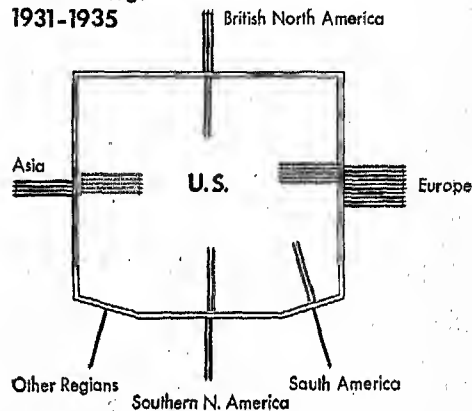
Annual Average
1926-1930



Annual Average
1916-1920



Annual Average
1931-1935



Each line represents 100 million dollars
black: value of exports of merchandise
red: value of imports of merchandise

The Kinds of Commodities the Nation Buys and Sells

Annual Average

Imports Exports

1906-1910



1916-1920



1926-1930



1931-1935



Each circle represents 500 million dollars
black: crude materials
green: foodstuffs
red, outline: semi-manufactures
red, solid: finished manufactures

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Pictured Encyclopedia
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tion for Visual Education

The flow of United States trade is shown for four periods of five years each. Note the tremendous growth during the World War period, 1916-1920, and the tremendous decline in the depression period, 1931-1935. Note also how trade with Asia remained the same and trade with Europe declined in the period 1926-1930. The lower part of the chart shows significant changes in the kinds of goods exported and imported before the second World War. (Data from 'Statistical Abstract of the United States'.)

1930-40, the rate of growth for the country as a whole was 7.2 per cent, as compared with 16.1 per cent for the period 1920-30. This is less than one-half the increase shown in any previous decade since the first census of 1790. The virtual stoppage of immigration and a falling birth rate account for the slowing down in growth. More than half of the people (56.5 per cent) live in urban centers with more than 2,500 population. The rural population includes 22.9 per cent living on farms, and 20.6 per cent living in rural areas but not on farms.

Metropolitan Districts

About one-fourth are grouped in a few great metropolitan areas. Largest is the New York City district. This includes nearly 12,000,000 people in the three states of New York, New Jersey, and Connecticut.

Boston Bay is the center of a metropolitan area with more than 2,000,000 people. Providence, R. I., Fall River and New Bedford, Mass., and the neighboring communities along Narragansett Bay and lower Buzzards Bay, make up another urban unit with about a million people. Another million live in and about Baltimore and Annapolis at the head of Chesapeake Bay.

On the Pacific coast, as on the Atlantic, every good harbor has been the nucleus around which metropolitan areas have grown. Among these are Los Angeles, the gateway to the Southwest, with nearly 3,000,000 people; San Francisco and Oakland on San Francisco Bay, with more than 1,000,000; and Portland near the mouth of the Columbia River, and Seattle on Puget Sound, each with about 400,000.

The Chicago metropolitan district, with almost 4,500,000 people, is the country's second largest economic unit. Good harbors on the Great Lakes were responsible also for the growth of Cleveland, Buffalo, Toledo, Detroit, Milwaukee, and Duluth. River junctions provided sites for St. Louis, Minneapolis, St. Paul, Kansas City, and Pittsburgh. Omaha, Cincinnati, New Orleans, and Louisville also owed their first importance to their position on rivers.

Redistribution of Urban Population

The most rapid growth in urban population in the decade 1930-40 has been in the West and the South. The new industrial centers of the South have been drawing workmen not only from Southern plantations and mountain farms but also from Northern cities. In 1880 the South had only three cities—Baltimore,

New Orleans, and Louisville—with a population of more than 100,000. In 1940, out of 92 cities in the United States with more than 100,000 inhabitants, the South had 21.

The rural population grew more rapidly in 1930-40 than it did in 1920-30—6.4 per cent as compared with 4.4 per cent. The farm population remained station-

ary, while the rural non-farm population increased by 14.5 per cent, against 18 per cent for the previous decade. For the urban population, however, growth was much slower in 1930-40 than in 1920-30—27.3 per cent as compared with 7.9 per cent. The major reasons for the striking drop in urban concentration were the lessened movement from rural to urban centers, the movement from cities to suburbs and rural villages, the virtual halt in immigration, and the smaller urban birth rate. All these factors seem to stem largely from the economic depression which prevailed in the 1930's.

The distribution of urban population over the country as a whole is determined mostly by the geographic

pattern of industry. An industrial society based on coal, such as the United States, has been concentrated necessarily in cities near the mines, and largely east of the Mississippi. This is still the basic pattern, with the Northeast region accounting for more than three-fourths of industrial employment; but there have been significant changes. One is the migration of certain industries to the South and of others to the West. Another is the tendency of industry to move from cities to industrial suburbs and rural communities. These shifts, inspired largely by the desire for lower operating costs, have been facilitated by power generators and transmission lines. Further decentralization of industry, with resulting movement of population to the smaller centers, may result also from the development of manufacturing uses for the wastes and by-products of agriculture.

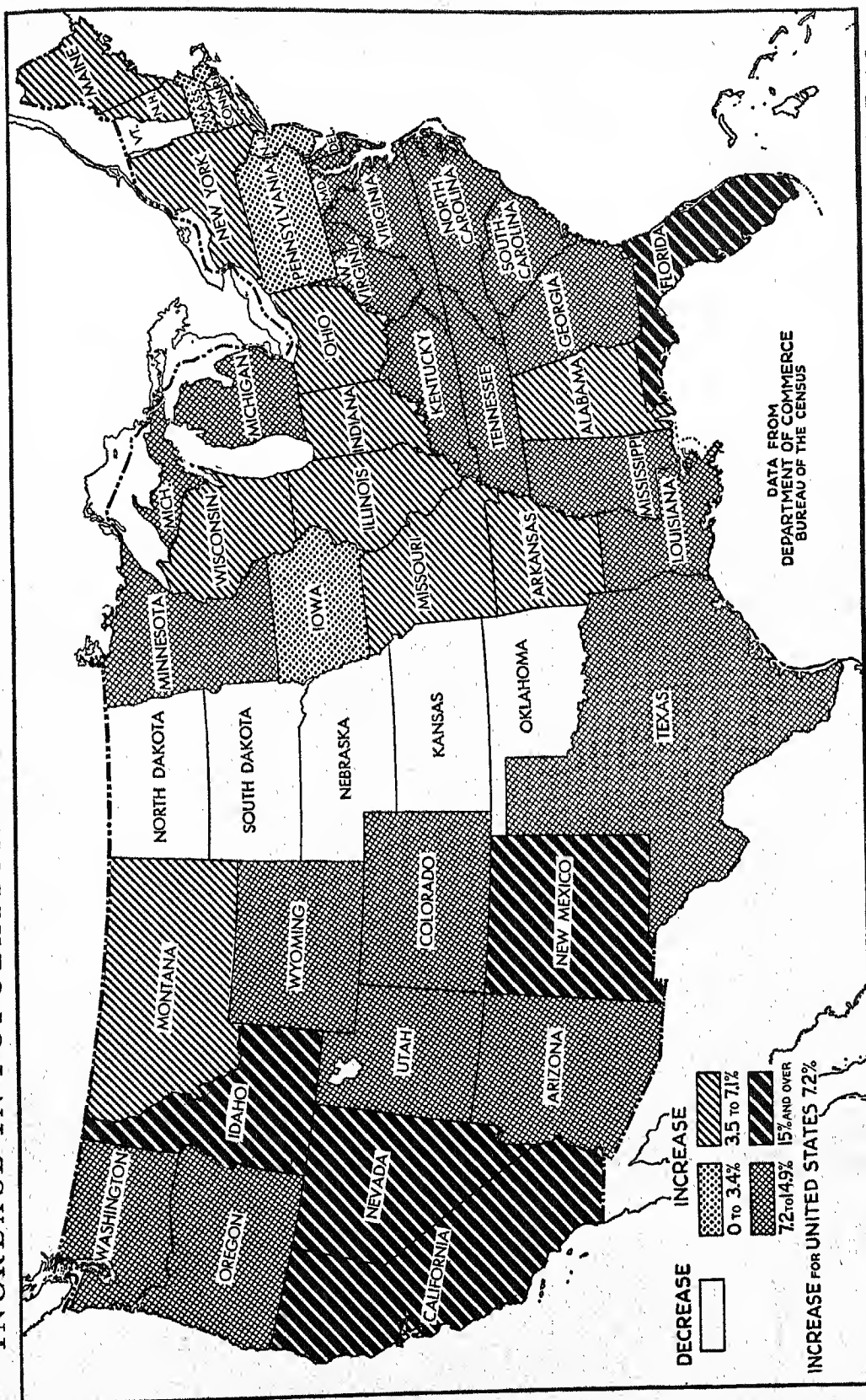
Growth in Population and Wealth

The first national census, in 1790, showed a population of 3,929,214. The last census shows that the population in 150 years has multiplied 33½ times. During the same period the estimated national wealth has multiplied about 500 times, from approximately \$600,000,000 to over \$300,000,000,000. In recent times the national income has ranged between about \$40,000,000,000 (1932) and \$90,000,000,000 (1941).

LARGEST CITIES OF THE UNITED STATES

CITY	POPULATION 1940 CENSUS	RANK
New York, N. Y.....	7,454,995	1
Chicago, Ill.....	3,396,808	2
Philadelphia, Pa.....	1,931,334	3
Detroit, Mich.....	1,623,452	4
Los Angeles, Calif.....	1,504,277	5
Cleveland, Ohio.....	878,336	6
Baltimore, Md.....	859,100	7
St. Louis, Mo.....	816,048	8
Boston, Mass.....	770,816	9
Pittsburgh, Pa.....	671,659	10
Washington, D. C.....	663,091	11
San Francisco, Calif.....	634,536	12
Milwaukee, Wis.....	587,472	13
Buffalo, N. Y.....	575,901	14
New Orleans, La.....	494,537	15
Minneapolis, Minn.....	492,370	16
Cincinnati, Ohio.....	455,610	17
Newark, N. J.....	429,760	18
Kansas City, Mo.....	399,178	19
Indianapolis, Ind.....	386,972	20
Houston, Tex.....	384,514	21
Seattle, Wash.....	368,302	22
Rochester, N. Y.....	324,975	23
Denver, Colo.....	322,412	24
Louisville, Ky.....	319,077	25

INCREASE IN POPULATION OF THE UNITED STATES, 1930 TO 1940



Florida grew faster than any other state between 1930 and 1940, with an increase of 29.2 per cent, followed by New Mexico with 25.6 per cent and California with 21.7 per cent. Taking the states in the large geographic groups indicated by the heavy lines, one can see that the largest percentage of increase was in the Pacific, Mountain, South Atlantic,

East South Central, and West South Central divisions. The West North Central division had the smallest percentage of increase, with four of these states actually losing in population. These four are in the Dust Bowl, which suffered from drought and dust storms through much of the decade. Vermont and Oklahoma also lost in population.

Continental United States has four standard time zones, each about 15 degrees wide (see Time). Yukon and Alaska time zones (not shown) are four and five hours behind Eastern time. The zone boundaries, as set up by the Interstate Commerce Commission, are drawn irregularly to meet railroad needs and are changed from time to time. The Commission,

for example, put all Georgia in the Eastern zone Nov. 23, 1941. After "war time" (one hour faster than standard time) was established for all the zones on Feb. 9, 1942, Michigan, Ohio, Georgia, and Florida considered adopting the Central zone war time for local use; but this did not affect the time schedules of railroads and other interstate carriers.

—REFERENCE-OUTLINE for Organized Study of the UNITED STATES—

THE study of the natural resources of the country and of the multitude of uses to which they have been put by the labor and inventive genius of the people—these are the most interesting and important points in the geography of the United States. From this point of view, the territory of the United States can be roughly divided into several natural regions, each of which is particularly adapted to certain classes of industries and occupations. These regions are indicated on the map on page 200. The boundaries of these natural regions also mark roughly the division of the states into five economic or political groups. As decade followed decade, many factors in addition to physiographic features have influenced the integration of American life. Therefore, instead of studying the nation by its physiographical units, it now seems best to study each state group, noting first how its unity was originally affected by physiographic conditions, and then how the life of the people has gradually been organized on economic, political, and social lines. Those who wish to study any state by itself will find full geographical and historical details in each state article, together with a map showing the principal physical features.

The New England States

This section comprises all of the northern division of the Appalachian highlands except the narrow strip of New York east of the Hudson River. Although other groups of states have greater natural resources and larger populations, New England continues to maintain its position as a leading manufacturing district. A long start, established capital, skilled workmen, and a reputation for good merchandise, these are the factors which enable New England to make a large part of the manufactured commodities of the country. New England possesses power in its many swift rivers, but most of the raw materials of its industries must be brought in. The surface of the land is generally broken and rocky, the only portions suitable for farming being the narrow river valleys and the lake bottoms. The section is poor in metals and coal, but the hills of the interior yield building stone, granite, marble, and slate, and the forests in the north yield tons of wood pulp.

I. **STATES IN THE GROUP:** Connecticut C-335; Maine M-37; Massachusetts M-80; New Hampshire N-85; Rhode Island R-95; Vermont V-284.

II. **PHYSIOGRAPHY:** (For general formation see Reference-Outline for North America.)

A. **Important Mountains:** White N-85, N-86 map; Green V-284, N-86 map; Berkshire Hills M-84, M-82 map; Mount Washington, the Highest Peak N-85.

B. **Effects of the Ice Age:** I-2, V-286.

C. **Slowly Sinking Coast Line:** N-153.

D. **Rivers and Lakes:**

a. **Chief Rivers:** Connecticut and Merrimack N-86, M-82 map, C-336, M-84 picture; Kennebec and Penobscot M-38 and map.

b. **Numerous Lakes, Mostly Small:** Champlain V-286, N-114 map; Moosehead M-38 map.

E. **Great Variation in Soil:** M-38, M-85, R-95, V-286.

III. **CLIMATE:** Sharp Seasonal Changes N-152, M-39; Abundant Rainfall U-191, N-150-1 map.

IV. **NATURAL RESOURCES:**

A. **Natural Harbors:** N-153, F-7. Boston B-199; Bath M-38-9; Bridgeport B-244; Fall River F-7; New Bedford N-80; New Haven N-88; Portland M-39; Portsmouth N-86.

B. **Numerous Streams, Waterfalls, and Rapids:**

a. **Abundant Power:** C-335, M-38, M-85, N-86, R-96.

b. **Inland Navigation:** Cities at the Head of Navigation—Augusta, Bangor M-88; Hartford H-233.

C. **Forests:** F-154, M-38, V-286-7, N-86, C-338, U-185.

D. **Minerals:** V-287, M-39. Granites G-131; Marble M-61; Slate S-158.

E. **Fish, Oysters, Clams, Lobsters:** F-79, M-82, M-39, R-96, L-175, C-258, O-262.

F. **Some Good Farm Land:** C-336, M-38, N-86, V-286.

G. **Scenery:** M-84, N-85, V-286. Acadia National Park M-39, N-19; Resorts N-85-6, V-286, M-37, M-84; Mount Desert M-39; Cape Cod C-80; Newport R-98, U-243.

V. **CHIEF INDUSTRIES:**

A. **Manufacturing the Leading Industry:**

a. **Textiles:** L-211, L-75, C-337 picture, N-86, N-87 picture, R-95, V-287. Cotton C-335, C-378, L-75, F-7, M-38, M-82; Silk C-335, R-95; Woolen C-335, L-75, P-357, B-244, M-82, N-86, R-95, W-145.

b. **Wood Products:** Wood Pulp and Paper N-86, M-81, M-83 picture, M-38, C-335, V-287.

c. **Boots and Shoes:** C-335, M-38, M-39, M-81, M-83 picture, L-223, N-86, N-87 picture.

d. **Metal Products:** Brass, Bronze, and Plated Ware C-335, C-336, B-244; Cutlery C-335, K-33; Firearms B-244, C-335, C-337 picture, W-145, H-233; Jewelry and Silverware P-357, B-244, C-336; Machinery M-81, H-233, L-223, N-88, P-357, B-244, W-145, C-335, M-11; Watches and Clocks C-335, C-337 picture, N-88; Wire W-145, V-287, M-82.

e. **Miscellaneous:** Ammunition N-88; Clothing B-202, C-336; Food B-202; Leather L-211; Musical Instruments C-335, H-233, V-285 picture, V-287; Rubber H-233, B-244, B-202, N-88.

f. **Food:** B-202. Canning M-38; Dairy Products V-285 picture, V-286, C-336; Maple Sugar and Syrup V-287, M-54-7 and pictures.

B. **Lumbering:** M-38, N-86, N-88 picture, V-285 picture, V-287, M-40 picture.

C. **Quarrying and Mining:** N-86, N-87 picture, N-88, V-286 picture, V-287, C-338. Granite Q-2, V-287; Marble V-287, M-60 picture, M-61, Q-2 picture.

D. **Fisheries:** F-79, F-81, F-82 picture, C-336, M-39, M-82, N-86, R-96, A-158. Salmon S-13; Oyster O-263 picture, O-265; Herring H-287; Lobster L-175, U-195.

E. **Shipbuilding:** C-335, M-38-9, A-158.

F. **Agriculture:** C-336, M-82, M-84 picture, V-286, N-86.

a. **Crops:** Apples, Peaches, and Pears M-38, V-285 picture, V-287; Blueberries M-38, B-159; Cranberries C-391, M-83 picture; Garden Vegetables C-336, M-38, M-85, N-86, R-95; Hay M-38, V-285 picture, V-286; Potatoes M-38, V-287; Tobacco C-336, C-337 picture, T-103.

b. **Livestock:** M-38, V-286-7, C-336, N-86.

VI. **PRINCIPAL CITIES:**

A. **Connecticut:** Bridgeport B-244, C-336; Hartford H-233, C-336; New Haven N-88; Waterbury C-336.

B. **Maine:** Augusta M-38; Lewiston M-39; Portland M-39.

C. **Massachusetts:** U-185-6. Boston B-199, M-81; Cambridge C-35; Fall River F-7, M-81-2; Holyoke M-81; Lawrence L-75, M-81; Lowell L-211, M-81; Lynn L-223; New Bedford N-81, M-81; Springfield S-264, M-81; Waltham B-202, M-82; Worcester W-145.

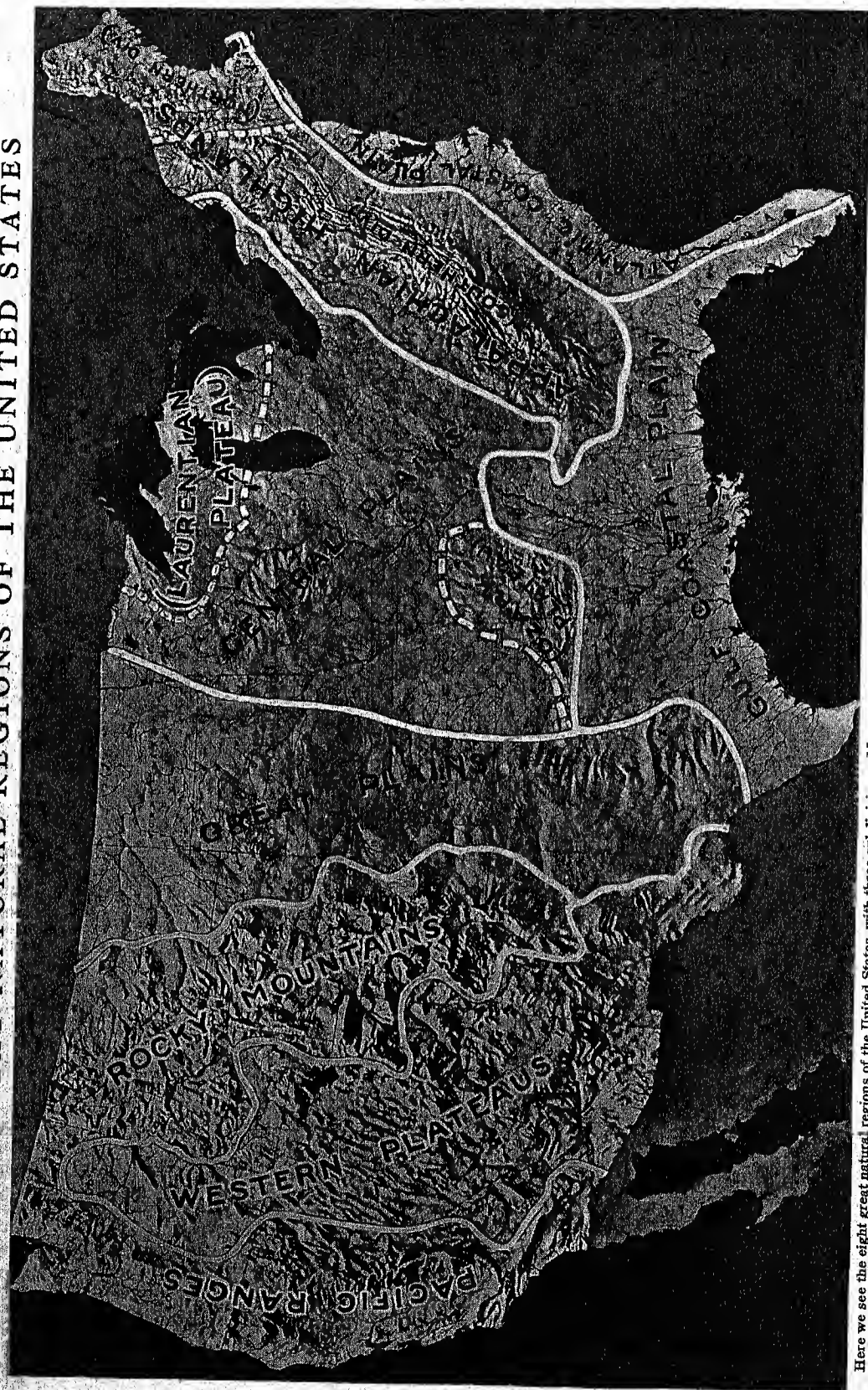
D. **New Hampshire:** Manchester and Nashua N-86; Concord N-88, N-87 picture.

E. **Rhode Island:** Pawtucket R-95, R-96 picture; Providence P-357, R-95-6, R-98; Woonsocket R-98.

F. **Vermont:** Montpelier, Burlington, and Rutland V-287.

Note: For other cities see entries in Fact-Index.

THE GREAT NATURAL REGIONS OF THE UNITED STATES



Here we see the eight great natural regions of the United States, with three subdivisions. Mastery of this regional grouping is important to the student of geography, because not only does it determine physical features, such as the flow of rivers, but it also indicates the activities pursued by the people within the regions. As we might expect, climate rules the plains regions. The Gulf Plain raises products suited to a warm climate. The Central Plains produce

crops typical of a temperate climate, and the Atlantic Plain shades from one to the other. The Great Plains, due to their comparative lack of water, are more suited to cattle raising—and the lack of water may be understood from the map, because the mountains far to the west block off the rains from the Pacific. In similar ways, the physiography of the other great regions shown exercises profound influence upon the lives of their people, as explained in the Outline.

The Middle Atlantic States

The Middle Atlantic states are the most densely populated area in the United States. Of the ten leading cities in the country, four, including New York, the largest, are in these states. This density of population has two causes: first, great natural resources, especially in coal, iron, and water power; second, a geographical position which has made these states a two-way gate—into the interior by way of the river valleys and the Great Lakes, and into foreign lands from the fine harbors which dot the Atlantic coast. These factors have made the Middle Atlantic states the greatest manufacturing area in the country. The millions of people engaged in manufacturing and other industries provide a market for garden produce. Only a few hours' ride from the large cities you will find large areas devoted to raising fruits and vegetables, chickens and dairy cows.

I. STATES IN THIS GROUP: Delaware D-39; Maryland M-76; New Jersey N-89; New York N-113; Pennsylvania P-111.

II. PHYSIOGRAPHY: The greater part of New York and Pennsylvania lies in the Appalachian highlands; most of New Jersey, Delaware, and Maryland lie in the Atlantic Coastal Plain, of which Long Island, Staten Island, and Manhattan Island are also a part.

A. General Characteristics: N-150, U-182.

B. Natural Features:

a. Important Mountains: A-230, U-182. Adirondack A-21, N-23, N-115 picture, N-114 map, H-350, U-185; Allegheny M-76, A-230, P-112, U-186; Blue or Kittatinny N-89, P-112, D-41; Blue Ridge A-230, M-76, U-186; Catskill N-116, N-114 map, N-113 and N-120 pictures, P-200-1; Highest Points—Negro Mountain P-112; Mount Marcy N-113, A-21; Backbone Mountain M-76.

b. Other Features: Palisades N-114, H-350, N-115 picture; Important "Gaps" U-183, N-118, D-41, P-112; the Highlands H-350, N-89; Piedmont Plateau G-31, P-112, M-76, N-89; Niagara Falls N-137-40.

c. Rivers: Geological History A-230; Delaware (Lehigh and Schuylkill) D-41, P-114, N-115 map, P-117 pictures; Hudson H-350, N-115 picture; Niagara N-137-40; Ohio (Allegheny and Monongahela) P-224, O-215, P-112 map; Potomac P-326, M-78 map, M-79 picture, C-68; St. Lawrence S-7-9; Susquehanna M-77, P-114, P-112 and M-78 maps.

d. Atlantic Coastal Plain: P-200, N-150.

1. Bays—Chesapeake C-182, P-198, D-39, M-76, M-78 map; Delaware D-41, P-114; New York N-123-4, U-188.

2. Capes—Henlopen D-40 map; May N-90, P-198.

e. Lakes: N-116, N-115 pictures, I-3, N-114 map. Erie E-300, G-146-50; Ontario O-227.

C. Soil: N-152, G-96, P-114, D-39, N-89, I-3, M-76, A-160.

III. CLIMATE: U-191, D-39, M-76, P-111, N-150-1 map, N-152-3. Gulf Stream A-359.

IV. NATURAL RESOURCES:

A. Minerals: U-194, U-195, N-91-2, M-77, D-39. Coal and Iron C-284, C-288, P-113, P-225, M-77, U-188; Gas G-23-4, P-114; Mineral Waters S-28, S-263; Petroleum P-151, P-114, U-186; Salt S-15, S-361; Limestone P-113, P-115, S-361.

B. Forests: U-185, U-194 and map, F-154, P-114.

C. Water Power: W-53, W-54 and picture, W-55, N-138, N-116 picture, N-119, U-186.

V. CHIEF INDUSTRIES: U-195-6.

A. Manufacturing: U-186, U-188, D-39, D-40 chart, M-76 chart, M-77, N-90-1, P-112 and chart, P-113-14, N-114, N-117 pictures, N-119, N-133.

a. Food: M-77, N-90, N-119, N-133, P-113, P-114, P-225.

b. Iron and Steel: D-39, D-40, P-113, P-114, P-225.

c. Petroleum and Coal By-Products: N-90, N-91, P-114.

d. Printing and Publishing: N-119, N-133.

e. Stone, Clay, and Glass: G-106, P-113, P-114, P-225, N-90.

f. Textiles: N-90, N-119, P-113 and pictures, P-114.

Clothing: C-277, M-77, P-113, P-114, N-119, N-133.

B. Agriculture: U-191 and map, N-118 pictures, N-119, P-111, P-116 picture, A-157.

a. Crops: Fruits and Vegetables A-231, D-39, D-40, G-136, M-76, N-89, N-92, F-213, N-119-20, P-93; Grain and Hay D-39, M-76, H-249, N-119, P-114; Tobacco T-103, M-76.

b. Livestock: P-114, M-76, D-5, N-89, N-119.

C. Fisheries: F-78-9, F-82 and picture, C-182, D-39, M-76. Oysters O-262, O-265.

D. Trade and Transportation: T-122, T-124-5, U-183-4, A-158. Rivers and Canals C-68-9, H-350, N-116, N-113, P-114, A-160; Great Lakes G-146, G-147, P-113; Harbors P-115, D-39, D-40 map, N-114, N-133; Railroads R-37, R-44, N-118-19, T-126, B-34, P-113; Roads R-112, M-77.

VI. IMPORTANT CITIES: The Middle Atlantic states are essentially an urban section. More than three-fourths of the total population live in cities and towns, 20 of which have a population of more than 100,000.

A. Delaware: New Castle D-39; Wilmington W-105, D-39.

B. Maryland: Baltimore B-33; Cumberland, Hagerstown M-77.

C. New Jersey: Jersey City J-210; Newark N-80; Paterson P-86; Trenton T-140; Elizabeth and Bayonne N-91.

D. New York: Albany A-108; Buffalo B-261; New York City N-123-34; Niagara Falls N-140; Rochester R-121; Saratoga Springs S-28; Schenectady S-38; Troy T-145; Utica and Yonkers N-120; Syracuse S-361.

E. Pennsylvania: Harrisburg H-227; Philadelphia P-158; Pittsburgh P-224; Reading R-59; Scranton S-51; Wilkes-Barre W-97; Other Cities P-115.

Note: For other cities and towns see also Fact-Index.

The Southern States

Although the South is sometimes divided by geographers into two groups, the Southeast and the Southwest, it is treated here as a unit, because in both groups the greatest industry is agriculture. If you will compare the map on page 200 with the one on page 191, you will see that the Cotton Belt coincides almost exactly with the Gulf Coastal Plain. Cotton is the chief crop of the South. Its cultivation, beginning in colonial days on the Atlantic seaboard, has spread to the West, and Texas is now the leading producer. Gradually, improved methods of farming and the prevalence of the boll-weevil have led to diversification, so that the South now produces many other farm products. Since 1880 there has been a marked industrial development of a new kind, due first to the exploitation of mineral resources in the Appalachian highlands and the Ozark plateau, and second to the utilization of water power which is available on almost every river in the South at the point where it leaves the highlands and descends to the coastal plain. Coal, iron, water power, these have created the industrial centers of the New South. Except in Florida, where over half the population is urban, about one-third of the people in the South live in cities and towns. There are relatively few large cities, partly because the coastal plain offered few good natural harbors, and partly because the agricultural pursuits of the people tended to keep them scattered in small communities. The census of

1940 showed a continuing of the trend toward urbanization in the South. Among Southern states, the most rapid growth of urban population in 1930-40 was in Florida, South Carolina, North Carolina, and Virginia.

I. STATES IN THIS GROUP: Alabama A-96; Arkansas A-295; Florida F-109; Georgia G-55; Kentucky K-10; Louisiana L-204; Mississippi M-199; North Carolina N-155; Oklahoma O-215; South Carolina S-212; Tennessee T-44; Texas T-53; Virginia V-303; West Virginia W-74. Washington (District of Columbia) W-22, geographically falls into the Southern group of states.

II. PHYSIOGRAPHY:

- A. Atlantic Coastal Plain: P-200, U-200 map.
 - a. General Characteristics: G-55, N-155, N-156, S-212, T-56, V-303.
 - b. Effects of Sinking Land in North: N-156, P-200. Great Bays and Wide River Mouths—Chesapeake C-182; Hampton Roads V-303; Potomac P-326.
 - c. Rising Land in South: Regular Coast Line, Low Sandy Shores, and Swamps S-212, G-55, F-109, F-113, F-116, V-303.
- B. Gulf Coastal Plain: P-198, A-98, T-56. Low and Marshy Where Recently Risen from Sea F-115-16, L-204, M-199.
- C. Piedmont Plateau: P-200, G-31, A-96, G-55, K-10, N-156, S-212, V-303.
- D. Southern Appalachian Highlands: A-230, G-55, K-10, N-155-6, S-212-13, T-44, V-304, W-74.
 - a. Special Features: Mammoth Cave N-19-20, C-116; Other Caves C-118, G-55, V-304; Cumberland Gap K-10, K-13; Natural Bridge V-304; Hot Springs N-19, A-295, V-304.
 - b. Influence on Transportation and Settlement: A-230, K-10, K-13, A-160-1, N-151, V-304.
 - c. Mountain Ranges: Allegheny W-74, W-76 map; Blue Ridge A-230, A-96, V-303-4, S-212, N-155, G-55; Cumberland A-96, K-10, T-44, T-45; Great Smoky A-230, N-156 map, T-44, T-46 map; Lookout A-96, G-55; Ozark Plateau, Ozarks O-266, A-295, A-296 map, M-207-8, O-218.
 - d. Important Valleys: A-230, T-44, V-304.
- E. Principal Rivers:
 - a. To Atlantic: Potomac P-326; Savannah G-56; St. Johns F-116; in Virginia V-304.
 - b. Mississippi Valley and Gulf: Mississippi M-204, M-206, M-199-200; Red O-218; Ohio O-214, T-45; Florida Rivers F-116.

Note: See also map for each state.

F. National Parks: N-19-20, N-18 map.

III. CLIMATE AND SOIL: The variety in physiographic features, and the modifying influence of ocean currents, are responsible for contrasts in climate and soil N-152-3, N-150-1 map. Alabama A-96, A-98; Arkansas A-295, A-296; Florida F-112, F-115; Georgia G-55; Kentucky K-10, K-11; Louisiana L-204; Mississippi M-199-200; North Carolina N-155; Oklahoma O-218; South Carolina S-212; Tennessee T-44; Texas T-53, T-54; Virginia V-303, V-304; West Virginia W-74.

IV. NATURAL RESOURCES:

- A. Forests: U-194, U-191 map, F-155, T-46, W-77.
 - a. Conifers: F-112, A-98, C-420, G-56, L-206, M-199, P-220-1, S-213-14.
 - b. Hardwoods: H-289, M-54, O-190, A-295, G-56, L-206, M-199, N-156, S-214, V-306.
- B. Fish: U-195. (For references on Fisheries see Leading Industries, below.)
- C. Minerals: U-196.
 - a. Petroleum and Natural Gas: A-295, K-13, L-206-7, O-217 picture, O-218, O-220 picture, T-54 and map, W-75 picture, W-76, P-144 picture, P-146 map, P-150, P-151, G-24, U-186.
 - b. Coal and Iron: C-284, A-96, K-13, O-217 picture, O-218, T-46, T-54, V-306, W-74, W-76-7, U-185.
 - c. Mineral Springs: A-295, M-202, M-207, F-116, T-45, V-304, W-74.

- d. Stone: K-13, M-202, G-56, T-46, O-218, N-158, S-214, V-306, W-77, A-96.
- e. Other Minerals: Bauxite A-139, A-295; Clay A-295, S-214, S-213 picture, T-46; Copper and Zinc T-46, T-48 picture, T-58; Diamonds D-59-60; Gold and Silver N-158, T-46, T-58, V-306; Helium T-57, H-271; Mica M-145, N-158; Nitrates S-213; Phosphate F-112, F-114 picture, T-46, S-213, S-214; Potash P-324; Salt L-206, S-15, W-77; Sulphur T-54, L-206, S-323 and picture.
- D. Water Power: G-55, N-157, S-212, T-45, A-96, O-215, Muscle Shoals A-98, W-49 picture, W-51.

V. LEADING INDUSTRIES:

- A. Agriculture: U-191 map, U-196.
 - a. Cotton the Chief Crop: U-191, C-376.
 1. Texas Largest Producer C-376, T-53.
 2. Other Large Producers A-96, A-295, G-55, L-204, M-200, N-156, O-218, S-213.
 - b. Corn, Texas Leads: T-53, A-96, A-295, G-55, K-11, L-204, M-200, N-156, O-218, T-46, V-304, W-76.
 - c. Tobacco, North Carolina Greatest Producer: N-157, K-11, K-12 picture, G-55, S-213, V-304, T-102-3, L-206.
 - d. Rice, Louisiana Leads: R-103, L-204, A-295.
 - e. Sugar Cane, Louisiana Leads: S-319, L-204, G-55, M-200.
 - f. Fruits and Vegetables: A-96, A-295, F-111-12, G-55, G-134, K-11, L-204, L-206, M-112, M-200, N-157, O-218, S-213, T-46, T-53, V-304, W-76, L-93, O-238.
 - g. Livestock: C-107-8, K-11-12, M-200, O-218, S-213, T-46, T-53, V-306, W-76.
- B. Fisheries: F-112, L-206, M-202, N-156, F-81, V-304, S-214, S-135. Sponges F-112, S-261 picture.
- C. Special Animal Production: Alligator A-129, F-112; Muskrat F-228, M-325.
- D. Mining: The references under Mineral Resources give the story of mining in this region.
- E. Manufactures: U-196.
 - a. Cotton Products: C-378, A-98, A-298, G-56, S-212, N-157, O-218, S-213, S-214, T-46, T-54, V-306.
 - b. Lumber Products: A-98, A-295, F-112, G-56, L-207, M-200, N-157, S-214, T-46, V-306, W-77, T-165.
 - c. Tobacco Products: F-112, K-12, N-157, N-158, V-306, T-7, T-104.
 - d. Food Products: Canning S-214; Flour and Mill O-218, W-77; Meat T-54, V-306; Rice L-207; Sugar L-204, L-207.
 - e. Miscellaneous: Brick and Tile A-98, G-56, M-202, W-77; Fertilizer L-207, M-202, S-213, F-27; Glass and Pottery G-106, A-298, L-207, S-214, W-77; Rayon N-157, T-46, V-306.

VI. COMMERCE AND TRANSPORTATION:

- A. Waterways: A-98, A-296, F-114, G-55, K-13, L-207, R-111, S-214, T-45, T-56.
- B. Railroads: A-98, F-114, L-207.
- C. Roads: R-112, R-114, A-296, K-12-13, M-200.

VII. CHIEF CITIES:

- A. Seaports: Charleston C-155; Galveston G-3; Houston H-346, T-57 picture; Jacksonville J-180; Key West K-15; Mobile M-212; New Orleans N-100; Norfolk N-149; Pensacola F-116; Savannah S-32; Tampa T-7.
- B. Manufacturing Centers on the Fall Line: Columbia S-214; in Georgia G-56; Montgomery A-96; Raleigh N-158; Richmond R-106.
- C. Interior Centers: Atlanta A-358; Augusta G-56; Austin T-56, T-58 and 60 pictures; Birmingham B-146; Charlotte N-158; Dallas D-5, T-57 picture; El Paso E-257; Fort Worth F-161; Jackson M-202; Little Rock A-298; Louisville L-209; Memphis M-114; Nashville N-12; Oklahoma City O-220; San Antonio S-21; Tulsa T-150; Vicksburg V-293.

- D. Resorts: Asheville N-158 and picture; Hot Springs A-295; Miami M-145; in Mississippi M-202; Palm Beach F-114, F-116; St. Augustine S-6; in Virginia V-304.

The North Central or Middle Western States

This group of states is important in almost every branch of trade and industry. The early settlers were drawn to the upper Mississippi basin by the vast areas of good farming land. This basin has rich glacial soils, ample rainfall, and suitable temperatures for maturing crops. Corn and wheat are by far the most important, but diversified farming prevails, and scarcely a grain, vegetable, or fruit suitable to temperate climates is not raised commercially. Many factories have been built to utilize the products of the farms. Thus flour mills were early important at Minneapolis and other cities, and meat packing became one of the reasons for the rapid growth of Chicago, Omaha, and Kansas City.

The early settlers quickly utilized the Middle West's many resources. The forests of the Great Lakes basin provided lumber for the wooden houses and fences which were characteristic of the early West. Coal, too, was abundant, and deposits of oil, gas, copper, lead, and other minerals were found. Cheap water transportation on the Great Lakes concentrated the steel and iron industry on the shores of these lakes even at considerable distance from the iron and coal mines.

In these North Central states the principal lines of trade and commerce run east and west, and do not follow the course of the greatest river, the Mississippi. One reason for this fact is that New Orleans, which might have been the natural center for commerce in the Mississippi Valley, was held either by France or by Spain during the years when the first settlers were pushing through the mountain passes and opening the West. The demand for the products of Western farms came not from New Orleans but chiefly from the states on the Atlantic seaboard and from Europe. It also happens that between the Rocky Mountains and the Appalachians no great natural barrier interposed to prevent easy transportation. Thus the great transcontinental railroads were built from east to west, and the North Central states, as a group, have more important trade and financial relations with the Eastern than with the Southern states.

- I. STATES IN THIS GROUP: Illinois I-12; Indiana I-45; Iowa I-119; Kansas K-3; Michigan M-150; Minnesota M-190; Missouri M-207; Nebraska N-57; North Dakota N-161; Ohio O-209; South Dakota S-217; Wisconsin W-122.

- II. PHYSIOGRAPHY: Two distinct plains areas, broken by two small highlands; the boundary between the Central Plains and the Great Plains runs approximately straight from Lake of the Woods to the southwest tip of the Ozark plateau.

A. Central Plains and Interior Highlands:

- General Character: Rolling Level Plains P-200, U-183; Interior Highlands—Ozark O-266, I-12; Laurentian L-72, U-200 map.
- Geological History: Mississippi Sea N-152; Erosion of Ancient Mountains M-190; Ice Age I-3, M-191, O-213, N-152.

- B. Great Plains: U-183, N-151, U-200 map. Treeless Prairies P-200, F-154, K-3, S-217, N-161; Black Hills S-217, S-219 picture; Bad Lands S-218, N-161, N-162 picture.

- C. Rivers and Lakes: Two great drainage basins, Missis-

sippi and St. Lawrence; only one important river, the Red River, flows elsewhere.

- Mississippi and Its Tributaries: Mississippi M-203; Missouri M-211; Ohio O-214; Other Tributaries I-12, I-13 map, I-120 map, N-57, W-122, W-124 map.
 - Red River: R-62.
 - Lakes: G-146, N-151, I-3. Erie E-300; Huron H-362; Michigan M-155; Superior S-331.
- D. Soil Formation: Glacial I-2-3, I-45, I-119, M-154, M-190-1, O-213, W-122; Alluvial M-204, M-207, P-201, I-45.

III. CLIMATE:

- Interior Continental Type with Extremes of Wind and Temperature: N-152-3, U-190-1, I-122, M-207-8, K-3, S-218, N-162. Moderating Influences—Great Lakes G-146; Ozarks O-266, M-207.
- Rainfall: U-191, N-150-1 map. Abundant on Central Plains K-3, M-190-1, M-208, I-122; Scarce in West N-57, N-152.
- Other Conditions: Winds G-146, U-191, W-113; Cyclones M-208, K-3, R-47, S-298, S-299 picture.

IV. NATURAL FEATURES:

- Rich Farm Lands Most Important: N-151, U-189, A-48-9, I-13, I-45-6, I-119, K-3, M-150, M-191, M-208, N-58, N-162, O-212-13, S-217, W-122-3 picture.
- Great Mineral Wealth: U-185, U-194-5.
 - Coal: I-14, I-48, I-120, K-5, M-150, M-208, O-210, C-284. Lignite N-162, S-219.
 - Iron: M-150, M-208, M-192, W-125, I-134 picture.
 - Other Metals: Copper M-150, C-357; Gold S-218-19; Lead and Zinc I-15, M-208, W-125.
 - Other Minerals: I-14-15, I-48, K-5, M-150, M-192, M-208-9, N-58, N-162, O-210, P-151, S-219, W-125.
- Forests: U-194, M-153-4, M-194, M-208, O-214, W-124.
- Fish: U-195, F-79, G-148, B-63, P-122, T-145.
- Large Sources of Water Power: M-206, M-194. Keokuk Dam I-120, I-121 picture; St. Anthony Falls M-194.

V. INDUSTRIES:

A. Agriculture the Chief Industry:

- Corn the Leading Crop: C-366, I-14, I-46, I-119, M-191-2, M-208, N-58.
- Wheat Second: W-82, I-14, I-46, K-4, M-190-1, N-162, W-124.
- Other Important Field Crops: Oats I-14, N-58, N-162, W-124; Rye N-162; Flax N-164, M-192, F-106; Sugar Beets M-152, N-58, S-217; Tobacco T-102-3, I-46; Celery M-152; Cranberries C-391, W-124.
- Fruits and Vegetables: I-14, I-46, M-152, M-192, M-208, N-58, O-212, F-213.

Note: For minor crops see articles on each state in this group.

- Livestock: M-208, M-192, S-219, K-5, N-164, N-58. Hogs M-208, O-212-13, N-58; Horses and Mules M-208, I-119, H-344, H-345; Sheep O-212, S-217; Poultry I-119, O-212.
- Dairying: D-5, K-5, M-192, N-164, O-212, S-219, W-124.

- B. Mining: The references under Natural Resources refer also to the mining industry.

- C. Manufacturing: Easy methods of communication, ready markets, and vast natural resources have made this one of the world's greatest manufacturing areas.

a. Metal Products:

- Iron and Steel I-138, I-144, G-17, I-15, I-48, M-192, O-212.
- Automobiles D-56-7, I-48, M-152, O-211 picture, O-212.
- Machinery C-187, I-15, I-48, I-122, K-5, M-209, O-212, W-124.

b. Food Products:

1. Meat M-96, M-153, C-187, I-48, I-122, K-6, K-7, M-194, M-209, N-58, N-60, O-225, O-212.
2. Flour and Mill Products F-120, K-5, K-6, M-194, O-212; Breakfast Cereals M-152-3, I-16.
3. Dairy Products M-194, N-60, W-123 picture, W-126, C-165, I-122, K-5, N-58, O-212.

c. Oil Refining: P-150, I-48, K-3.

- d. Others: Forest Products I-48, F-222, M-152, W-124, C-186 picture; Chemicals I-15, M-153, D-58; Leather W-124, C-186 picture; Rubber O-212, R-166, A-95; Portland Cement I-48, K-5, M-153; Glass and Pottery I-48, M-209, K-5, G-106, O-212; Clothing C-281, I-15, M-153, W-124; Boots and Shoes M-209, M-194, W-124, S-9.

Note: In the articles on each of the states and the principal cities in this group you will find additional material on industries.

D. Transportation and Trade:

- a. Lakes: G-146, R-111, C-189, I-15, I-47, O-210, W-124.
- b. Rivers and Canals: R-111, C-69, I-15-16, I-47, M-150, M-209, M-153, O-210, S-31.
- c. Railroads: C-189, I-48, I-50, I-122, K-6, M-209, N-165, O-210, R-37.

VI. CHIEF CITIES: Most of the large cities of this region were founded at points which were natural spots for loading and unloading water freights. When the railroads were built, usually from east to west, they connected these various river and lake ports, which became terminals and transshipping points.

- A. Lake Ports: Chicago C-187; Cleveland C-268; Detroit D-56; Duluth D-119; Gary G-17; Milwaukee M-180; Toledo T-105.
- B. River Ports: Akron A-95; Cincinnati C-236; Dayton D-22; Des Moines D-55; Evansville I-48; Grand Rapids G-131; Kansas City (Kan.) K-6; Kansas City (Mo.) K-6; Louisville L-209; Minneapolis M-190; Omaha O-225; Peoria I-16; St. Louis S-9; St. Paul S-11; Wichita W-97.
- C. Other Important Cities: Columbus C-319; Fort Wayne I-48; Indianapolis I-50; South Bend I-48; Springfield (Ill.) I-18, S-263; Youngstown Y-208.

The Western States

Rising abruptly from the Great Plains, the Rocky Mountains form a great barrier which sweeps across seven-eighths of the United States. These mountains are the most important watershed in North America, giving rise to four large river systems—the Mississippi-Missouri, the Columbia, the Colorado, and the Rio Grande. Roughly parallel to the Rocky Mountains, and separated from them by a long stretch of broken plateau lands, are several great ranges which may be grouped as the Pacific or Coast ranges. Although this group of states has wide variations in climate, soil, minerals, and other natural conditions, it has one dominating feature—mountains. Nowhere else in the world is the effect of mountains on climate, and the effect of climate in turn on the lives of the people, better demonstrated. The mountains almost completely encircle the plateau region, and rob the winds of their water before they reach it. The soil, however, is extraordinarily fertile, and in those sections where irrigation is possible, or where the rainfall is more than the region's average of ten inches a year, fine crops can be grown. The west slope of the Pacific ranges, on the contrary, is a paradise of even temperatures, with abundant rainfall, luxuriant native vegetation, great cities, and thriving industries. The warm winds from the Pacific release their moisture either as rain or snow when

they strike the mountains. In the many sheltered valleys agriculture flourishes. Water power abounds. Vast deposits of coal, gold, silver, copper, and other minerals have been developed. The forests and the ocean, too, have contributed of their stores to create industries for man.

I. STATES IN THIS GROUP: Arizona A-287; California C-25; Colorado C-309; Idaho I-7; Montana M-242; Nevada N-76; New Mexico N-94; Oregon O-243; Utah U-263; Washington W-28; Wyoming W-192.

II. PHYSIOGRAPHY: Three Natural Divisions Forming the Cordilleras U-182, N-151, M-292.

A. Rocky Mountains: R-123, U-182, N-150-1 map.

- a. Chief Ranges: R-124, C-312, N-94, W-192, also maps on C-310, M-243, N-97, U-264, W-194.
- b. Important Peaks: R-124. Longs Peak and Mount Elbert C-312; Pikes Peak C-308 and C-313 pictures, C-312; Holy Cross Mountain C-312, C-314 picture.
- c. Continental Divide: C-309, C-312, R-123 picture, W-192.
- d. Chief Rivers Rising in the Rockies: Colorado C-315, U-188-9 map, C-314; Columbia C-315, W-29, O-244 picture, O-246 map; Yellowstone M-211, M-243 map; Rio Grande R-109, N-96, U-188-9 map.
- e. Lakes: Flathead M-243 map; Jackson W-192 picture, W-194 map; Yellowstone W-194 map; Glacier National Park G-95, G-96, N-18 map, N-19, N-16 picture.
- f. Geological History: N-152. Young Mountains R-124; Work of Rivers M-292; Volcanic Formation V-332, I-10 picture.

B. Great Western Plateaus: U-182, N-151.

- a. Columbia Plateau: U-182, I-8, U-192.
- b. Colorado Plateau: U-182. Cut by the Grand Canyon A-288, A-289 map, G-129.
- c. Great Basin: U-182, N-76.
 1. Chief Deserts U-182, U-264, C-30, A-288, A-289 map.
 2. Death Valley C-26, C-32 picture, D-22.
 3. Principal Rivers Rise in the Rockies and Flow West Across the Arid Regions. (See Rivers under Rocky Mountains.)
 4. Great Salt Lake G-151, U-264 map, U-265 picture.

C. Pacific and Coast Ranges:

- a. Sierra Nevada: S-141, U-182, C-26 map, N-76. Mount Whitney C-25, C-33 picture; Mount Shasta S-141, U-182; Lake Tahoe N-77.
- b. Cascades: U-182, O-244, O-246 map, W-28. Mount Rainier W-28 picture, W-29; Mount Hood O-243, O-247 picture.
- c. Coast Ranges: C-25, O-244, U-182, W-28-9. Mount Washington, Mount Jefferson O-246 map.
- d. Geological History: W-29, N-152, V-332, S-141.
- e. Chief Valleys: Puget Trough U-183; Imperial Valley C-28; Great Sacramento Valley C-28-9; Yakima Valley W-30 picture; Yosemite Y-207.
- f. Rivers: Sacramento, San Joaquin C-28, U-182, S-1.

D. National Parks and Monuments: N-15-19, N-20-22.

III. CLIMATE: Mountains Establish Three Well-Defined Zones:

- A. Pacific Coast—Averages More than 30 Inches of Rain a Year: U-191; N-152-3, N-150-1 map, W-113, R-47, R-48. California C-26, C-28, C-29, U-191; Oregon O-244, R-47, R-48; Washington R-47, R-48, W-28.
 - B. Plateaus—Less than 10 Inches of Rain a Year: U-182. Arizona A-287, A-288, A-290; Nevada N-76; Utah U-263.
 - C. Rocky Mountains: U-191, C-312-14, W-192, N-96, I-7.
- IV. NATURAL RESOURCES:
- A. Fertile Valleys: In California C-28, C-29, S-1; Others W-30 picture, O-246, N-97, M-244, C-310, W-192, I-9.

- B. Forests: U-194, F-154, F-155-6, F-157, A-290, C-26, C-29, C-312, I-9, M-242, N-76, N-96, N-98, O-244, W-29. Sequoias S-79, C-27 picture.
- C. Minerals: U-194-5.
- Precious Metals: Gold C-30, G-111, I-9, C-311, A-290, N-77, U-263; Silver S-153, U-263, A-290, N-77, I-9; Platinum C-30, P-247.
 - Other Metals: Copper A-290, C-357, I-9, L-76, M-243, U-264.
 - Precious Stones: N-98, C-309, M-244, G-28-9.
 - Other Minerals: Coal W-30, W-194, M-243, A-290; Petroleum C-30, M-244, W-194, P-151; Borax B-192.
- D. Fish: F-78, F-79, F-81, U-195, B-50, C-30, O-246, S-13, S-28, W-29-30.
- E. Water Power: A-290, C-30, C-315, M-244, W-30, W-51.
- F. Scenery: pictures A-291, C-27, C-31-3, C-309, C-313, G-130, I-10, N-14-19, N-97, N-115, O-244, O-247, W-28, W-28a, W-193, Y-207.
- V. INDUSTRIES:
- A. Agriculture:
- Dry Farming and Irrigation: C-28, A-290, C-29, I-8-9, M-244, N-76, N-97, O-244, U-264, W-29, W-194.
 - Fruits: F-213, C-28-9, O-246, W-29. Citrus Fruits—Oranges O-238, C-29; Lemons L-93d; Grapefruit G-133-4; Limes L-138; Other Fruits—Grapes G-135-6, C-29; Apples A-231-2, O-246; Peaches P-93; Pears P-95; Plums P-260; Figs F-31; Dates D-18; Apricots A-233; Olives O-223, C-29; Nuts N-187, C-29, W-5.
 - Field Crops: Alfalfa A-117, A-290; Cotton C-382, N-97; Sugar Beets C-310, W-194, I-9, S-319; Potato P-324, P-325 picture, P-326, M-244, I-9; Hops H-338, O-246; Rice C-29, R-103.
 - Live Stock: W-194, S-106, N-97, A-290, N-76, I-9, M-244, W-29, O-244. Ostrich O-253, C-28; Bees B-76, C-28.
- B. Lumbering and Lumber Products: I-9, W-30, M-244, C-30, L-213, L-218.
- C. Mining: The page references given under Natural Resources also refer to the mining industry.
- D. Manufacturing: In the mountainous areas, the manufactures are almost exclusively the smelting and refining of ores; the references to Minerals under Natural Resources may be used. On the Pacific coast, the leading industrial establishments pack fruits, vegetables, and fish.
- Food: C-30, C-311, I-9, M-244, N-77, U-266, W-29. Canning C-74, U-266, W-31 picture, O-246, C-27 picture, C-30; Dried Fruits D-38, I-9; Raisins R-48, C-29; Prunes P-358, C-29.
 - Motion Pictures: M-276, C-27 picture, L-198.
- VII. TRANSPORTATION AND TRADE:
- A. Transcontinental Railroads: R-37, R-38, R-42, C-30, L-198.
- B. Trade with the Orient: S-24, S-71a. Panama Canal P-53.
- C. Roads: C-30, W-30, I-10, R-112, R-114, O-244 picture, O-246.
- VII. CHIEF CITIES:
- A. Ocean Ports: Los Angeles L-196; Oakland O-190; Portland P-306; San Diego S-23; San Francisco S-24; Seattle S-71a; Tacoma T-1.
- B. Created by Minor Discoveries: Boise I-11; Sacramento S-1; Spokane S-260.
- C. On Trade Routes: Albuquerque and Santa Fe N-98; Ogden U-266; Salt Lake City S-16; Tucson A-290.
- D. Resorts: Phoenix (Fact-Index); Pasadena L-196; Long Beach L-191.

Possessions of the United States

- I. ALASKA: A-100.
- A. Physiography: Boundaries and Area A-101, A-105 map, B-97, N-150-1 map; Climate A-102; Rainfall N-150-1

map; Soil A-100-1, A-104; Mountains N-150-1 map, A-101-2, R-123-4, M-13; Plateau and Plains A-101-2; Yukon River Y-214, A-105 map; Bering Sea B-97; Glaciers G-95, N-151, A-101.

B. Industries:

- Mining: A-100, A-106, N-151, Y-214. Gold G-111; Copper C-357; Coal C-284; Platinum P-247.
- Fisheries: F-76, A-100, A-106. Salmon S-13; Walrus W-6, A-101 picture.
- Fur Industry: A-100, A-102, F-228, A-106-7, S-69-70 and pictures.
- Reindeer Raising: A-100, A-106 and picture, R-71, U-230, C-84.
- Forests: A-100, A-104.
- Agriculture: A-102, C-105.

C. Natives: Eskimos E-300, I-52, I-56, A-277.

D. Transportation: By Airplane A-104, A-106-7; Railroad A-104; Dogs D-78.

II. ISLAND POSSESSIONS:

A. In the Atlantic:

—Puerto Rico P-307, N-150-1 map; Virgin Islands V-309, N-150-1 map.

B. In the Pacific: (See article on the Pacific Ocean P-1 for general geographic background.)

—Guam G-181; Hawaiian Islands H-239, H-243 map; Philippines P-164, A-332-3 map; Samoan Islands S-20; Wake W-2.

III. CANAL ZONE: P-39, 40, N-150-1 map, P-41.

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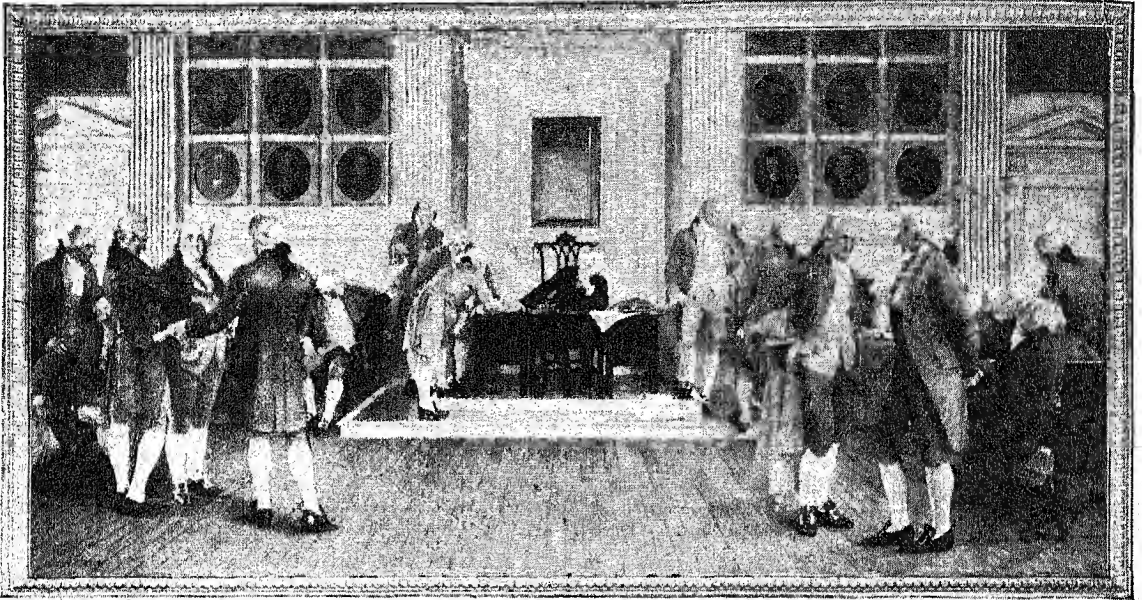
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The FUNDAMENTAL LAW of the NATION



The Signing of the United States Constitution, from a Mural by Albert Herter in the Wisconsin State Capitol

UNITED STATES CONSTITUTION. Most people think of the United States as a young country. Yet it has the oldest written constitution among the important nations of the world.

The three million people of the United States had no sooner won the Revolutionary War than various groups among them became discontented with the Articles of Confederation (*see* Articles of Confederation). The government under the Confederation seemed too weak to keep the people in order at home, or to make the little republic respected abroad. One great difficulty was that Congress lacked sufficient power to raise money—it could only make requests of the states. It was always poor, while generous states like New York and Pennsylvania complained that they paid more than their due share. Another difficulty was that it had no authority to regulate commerce. When some states began laying tariffs and other burdens on the shipping trade of their neighbors, this commercial warfare caused heavy losses. All states were supposed to abide by the Articles of Confederation. Yet some states violated them by making treaties with the Indians, by making agreements with each other, by ignoring the treaties Congress made with European nations, and by regulating the value of money.

To many patriotic citizens it seemed by 1785 that the Confederation was a failure. Washington, Hamilton, Jay, Madison, and other leaders repeatedly declared that the government ought to be strengthened. In 1782 the assembly of New York, and in 1785 the legislature of Massachusetts, voted in favor of a constitutional convention. The great question was how to win over the reluctant or indifferent majority.

Fortunately there were several large bodies of Americans who had special and important reasons for wishing a stronger government. One was made up of the Westerners who after the Revolution pressed into Kentucky, Tennessee, and the new Northwest Territory. They wished for a powerful federal government to protect them from the Indians and the encroachments of the Spaniards and the British. Men who speculated in western lands believed that a strong government would make these lands worth more. Another large group was made up of the merchants, traders, and shipowners who suffered from little tariff wars among the states, and from injurious British laws. A considerable number of men who had lent money to the United States during the war or just after it believed that a strong government would be more likely to repay them.

Perhaps most important of all was the large body of well-to-do men who owned mortgages, notes, or other evidences of indebtedness. They feared that state legislatures controlled by the poor debtors would issue huge sums of worthless paper money, or would protect debtors in refusing to pay what they owed. They desired a strong national government to take complete control of the currency, and to prevent any state laws impairing the obligation of contracts. Shays' Rebellion in Massachusetts in 1786 deepened this feeling (*see* Shays' Rebellion).

But the convention which wrote the new Constitution was not easily called. It had to be prepared for by a number of small steps. The first was merely a meeting between representatives of Virginia and of Maryland in 1785 to settle disputes over the navigation of the Potomac River. Washington and Madison took

the lead in having this meeting called. It proved so successful that Maryland went a step further and proposed that Pennsylvania, Delaware, Maryland, and Virginia should all appoint commissioners to meet and adopt a uniform commercial system. The shrewd Madison saw the opportunity of doing something still more important. He proposed a convention not of four states, but of all the states, to discuss the commercial conditions of the time and to devise an amendment to the Articles of Confederation. This convention was to meet in Annapolis in 1786.

When the time came only five states sent representatives to the convention in Annapolis, and their opinions were far from harmonious. But Madison and Hamilton were both present and looking toward the future. They persuaded the representatives before adjourning to issue a call for a general convention of all the states to meet in Philadelphia on the second Monday of May 1787. This was to be the Constitutional Convention. But because many people were suspicious of any such action, the call had to be made cautiously. It proposed that the gathering should "take into consideration the situation of the United States," and devise improvements in the government. Congress, after some hesitation, finally endorsed the plan, declaring that the states should send delegates for the sole and express purpose of revising the Articles of Confederation.

The plan for the convention had the warm support of Washington, Franklin, and other eminent men. Virginia was the first state to choose delegates, and contributed greatly to the success of the undertaking by selecting Washington. Before the date set, 11 states had named their delegates. New Hampshire did not send her members until the work was well begun, and Rhode Island, then controlled by a paper-money party, refused to send any at all. In all the states the legislatures, not the people, chose the delegates.

A Notable Assembly

The convention was not a large gathering, for only 55 men, from first to last, attended. But it was a body of very remarkable ability. Any American who, in the summer of 1787, happened to be in the city of Philadelphia, with its broad leafy streets and red brick buildings, would have seen such a collection of statesmen as could hardly then be matched in any other country. He would have seen Washington striding at the head of the Virginia group—James Madison, Edmund Randolph, George Mason, George Wythe, John Blair, and James McClurg. He would have noticed Benjamin Franklin talking with three of the other Pennsylvania delegates—James Wilson, who was one of the ablest lawyers in America, Robert Morris, the financial leader of the Revolution, and Gouverneur Morris. New York contributed, along with two "States' Rights" delegates who soon withdrew, the brilliant Alexander Hamilton. From South Carolina came John Rutledge, Charles Pinckney and C. C. Pinckney. Massachusetts sent Elbridge Gerry and Rufus King; Connecticut sent Roger Sherman and

Oliver Ellsworth. It was a body of men well fitted to produce a great document. A large majority of the delegates were lawyers; most of them had had experience in government; and nearly all of them were either men of large property interests, or close to men who had such interests.

Pass Rule for Secrecy

The convention opened tardily on May 25, in the brick State House in Philadelphia, where the Declaration of Independence had been signed. Washington was unanimously elected to preside, a fact which prevented him from taking active part in the debates. Three principal rules were adopted. The votes were to be taken by states, each state having one vote; seven states were to constitute a quorum; and strict secrecy was to be preserved. The delegates wished to be safe from outside criticism or pressure. The official journal kept was the merest record of motions and votes, and was not published till 1819.

These rules having been adopted, the delegates turned to a task upon which there was no general agreement. The overshadowing question was whether they should merely revise the Articles of Confederation, or should make a new constitution. Most delegates had been elected upon the understanding that they were merely to revise the existing government, and some had specific instructions to that effect. But Washington advised against "temporizing expedients." Within a week the convention resolved in committee of the whole that "a national government ought to be established consisting of a supreme legislative, executive, and judiciary," and such leaders as Madison and Hamilton calmly assumed that this meant a complete new constitution.

This done, the convention faced two problems which loomed up above all others. If a strong federal government was established, how was it to be given authority? Was it to be permitted to coerce the different states? If so, just how? In the second place, how was power to be adjusted between the large states, like Pennsylvania, and the small states, like Delaware? As the work progressed, other questions arose and had to be settled by a process of give and take. The Constitution in its final form was a bundle of compromises, but the great compromise was that between the large and the small states.

Two important plans shortly came before the convention—the so-called "Virginia plan," presented as a series of resolutions which were largely the work of Madison, and the "New Jersey plan." The Virginia plan represented the standpoint of the large states, and involved writing an entirely new constitution; the New Jersey plan represented the ideas of the small states, and was simply a set of amendments to the old Articles. Under the Virginia plan there was to be a national legislature or congress of two chambers, in which the states should be represented in proportion either to their money contributions or to their free populations; the members of the lower house were to be elected by the people, and were to choose the upper

house out of lists submitted by the state legislatures. The chief executive was to be elected by the national Congress, for a single term, and there was to be a Supreme Court and a system of lower courts. The New Jersey plan provided for a national congress of one house, in which each state was to have a single vote. The chief executive was to be chosen by Congress, and there was to be a system of federal courts. Still another plan was presented by Charles Pinckney; this has not been preserved and it had little effect upon the discussions. Hamilton also offered an outline of his ideas upon the new Constitution, his "propositions" suggesting a very powerful central government, with a chief executive and a senate chosen for life terms, and with the states reduced to a very weak position. His ideas had little influence. Of all the schemes, the Virginia plan was much the most important.

The Great Compromise

The debate on the Virginia and New Jersey plans revealed the dangerous jealousy between the large states, demanding representation according to population, and the small states, insisting upon equal representation. Men on each side repeatedly threatened to break up the convention and go home. The large states were the stronger, and carried a resolution against equal representation in the lower house of Congress. Thereupon the Connecticut delegates brought forward a successful compromise. They proposed that the states be equally represented in the Senate, and represented according to population in the lower chamber or House. After much grumbling the large states accepted this scheme.

Then followed a series of minor compromises. In computing the population of the states for representation in the lower chamber, should slaves be counted? The Southern states naturally demanded that they should, while the Northern states wished them passed over as mere property. Fortunately the Continental Congress had already provided a method of settling this dispute. In 1783 it had proposed an amendment to the Articles of Confederation by which the money requisitions upon the states were to be based upon population, with three-fifths of the slaves counted. This amendment had been accepted by 11 states. It was now decided that in determining representation in the House of Representatives, five slaves should count for three white persons. Another compromise dealt with the federal regulation of commerce. The Northern states, which had suffered from commercial chaos, wished to give Congress ample powers in this field, while the farming states of the South feared that Congress might lay an export tax upon their cotton and tobacco. The result was that Congress was given wide powers over navigation, foreign and interstate trade, and custom duties, but was specifically forbidden to levy export duties.

Still another compromise had to do with the importation of negroes from Africa. Though slavery was not yet a sectional issue, some Northerners would

gladly have seen this cruel slave trade abolished. Moreover, Virginia and Maryland bred slaves for the market, and wished to stop the African competition. But Georgia and the Carolinas protested, and a compromise provided that Congress might stop the importation in 1808, but not sooner.

Little by little, as the summer wore on, a strong central government was hammered out on the forge of the convention. The now familiar features—the representatives chosen for two years, and the senators for six; the president serving four years, with possible reelection; and the federal judges appointed for life—were agreed on. One striking feature of the new Constitution was the large power given to Congress over economic and financial affairs. Not only was Congress authorized to regulate commerce, but it was given the right to raise money by taxation, to borrow on the national credit, and to coin money and regulate its value. Strict provisions were inserted forbidding the states to issue paper money, or to pass laws impairing the obligation of contracts; these clauses reflected the unhappy recent history of some states. The debts contracted under the Confederation were recognized as valid. The unanimity of opinion on these features was striking. There was no struggle in the convention between creditor groups and debtor groups, between representatives of the poor and of the wealthy.

The great problem of how to give the Federal government proper authority was finally solved with surprising ease. This was done by providing that the new government should operate not upon the states, but directly upon the people. Its mandates were to be carried out not by orders and demands upon a set of semi-independent state governments, but by the quiet activity of its own administrative officers, attorneys, marshals, and courts. The Virginia plan, the New Jersey plan, and the Pinckney plan had all proposed some method of coercing the states. But all schemes for state coercion were obviously dangerous and futile. They would be sure to break down. Madison wisely perceived that it would be sufficient to vest in the new general government the power to proceed against individuals all over the nation. The two systems, State and Federal, would for the most part operate on parallel lines. But whenever they came into conflict the Constitution, as the supreme law of the land, would define their respective spheres.

The Constitution Is Drafted

By September the work was nearly done. The essentials of the Constitution, based on the Virginia plan, had first been thrashed out in committee of the whole. The work of this body was reported to the convention for full debate and amendment. Then, near the end of July, the draft of the Constitution was handed over to a committee on detail, which gave it many finishing touches. As a final step, Gouverneur Morris went over the completed Constitution to put it in the clearest and most precise English. On Sept. 17, 1787, it was signed by 39 members and was ready for the people to approve or reject.

At the outset it seemed doubtful whether the Constitution would be ratified by the nine states that the convention declared would suffice to make it effective. For almost a year the American people were interested in nothing so much as whether the "new roof" would be accepted. It was discussed in taverns, in shops, and on the streets. Everyone knew that most of the rich folk who owned fine houses and estates and held notes were for it; so were the successful professional men—most of the lawyers, doctors, and ministers; and so were nearly all the merchants. The creditors both of the state governments and of the Confederation strongly favored it. But the poor people, the workingmen, farmers, and many backwoodsmen, were in large part suspicious of it. Such able leaders as Patrick Henry and Samuel Adams, who were deeply attached to local liberty, showed hostility because they feared an undue concentration of authority. Many people declared, and with reason, that the Constitution was faulty because it contained no guarantee of the simplest human rights—freedom of speech, freedom of the press, freedom of assemblage, and religious freedom.

Fight for Ratification

If the Federalists, as the advocates of the Constitution were called, had not used the cleverest tactics, they would have been defeated. One by one the states held conventions to debate the instrument. A favorable impression was produced when the first five conventions readily voted for ratification. Delaware came under the "new roof" on Dec. 7, 1787; Pennsylvania on December 12; New Jersey on December 18; and within the first two weeks of 1788, Georgia and Connecticut. But in other states hard fighting was required. In Massachusetts a majority of the delegates was at first unfriendly, and the convention wrangled for almost a month. The Federalists were led by Rufus King, Gen. Benjamin Lincoln, and others. By determined argument, by bringing special influences to bear on the influential Samuel Adams and John Hancock, and by consenting to nine suggested amendments, they finally won. In Virginia, also, there was a difficult struggle. Patrick Henry and George Mason insisted that the Constitution should not be ratified. But the Federalist forces were skilfully directed by James Madison and John Marshall, while Washington's influence was powerful. On June 25, 1788, after excited scenes in Richmond, the Virginia convention ratified by a close margin. Without Washington's state, the whole plan of the Constitution would have failed.

But the hardest battle of all occurred in New York, where only the genius of Alexander Hamilton won the victory. He hit upon the happy idea of publishing in the New York newspapers a series of essays explaining and defending the Constitution. These were later issued in book form under the title 'The Federalist.' Madison and Jay contributed some of them, but Hamilton wrote the great majority. No equal exposition of the Constitution has ever been penned. When

the convention met in Poughkeepsie, the Anti-Federalists had a two-thirds majority. But Hamilton was a host in himself, and he had able lieutenants in Jay and Robert R. Livingston. Their irresistible arguments were assisted by the fact that all but two other states had already ratified, and it was a question of union or disunion. On July 26, 1788, by a vote of 30 to 27, New York accepted.

The Constitution which thus became the supreme law of the land seemed then to most people to contain marked imperfections. Later it was realized that the Convention of 1787 had builded better than it knew. The strength and symmetry of its handiwork have been the admiration of the world ever since, and have had a profound influence in many parts of the globe. Gladstone paid tribute to the Constitution, though in somewhat mistaken terms, as "the most wonderful work ever struck off at a given time by the brain and purpose of man."

It is true that in some respects the makers of the Constitution miscalculated. Their greatest error, hardly avoidable because of public opinion, was their refusal to define more precisely the sphere and rights of the states, including the so-called "right of secession." This contributed later to the catastrophe of the Civil War. The careful plan for indirect election of the president by an electoral college was shortly nullified by the growth of political parties, and custom has made the electors mere nonentities. No one saw at the time what a powerful place would be occupied by the Supreme Court; and though a majority of the leading men of the convention seem to have believed that the Court would possess the right to pass upon the constitutionality of acts of Congress, there was no explicit statement to that effect. Some grave questions the Constitution failed to treat at all. For example, it contained no provision regarding the future annexation of territory. Naturally, many commercial questions which have arisen in the last two generations were quite beyond the ken of the authors of the Constitution. They certainly did not expect the Federal government to become so strong, at the expense of the states, as it has become. But on the whole the work of the "fathers" must always challenge our admiration.

Its Deep-Rooted Origins

One salient reason for the success of the Constitution lay in the fact that it was not really, as Gladstone said, "struck off at a given time," but was rather the result of generations of growth. It was a noble tree which rose from the two great tap-roots of English and colonial self-government. We can trace nearly everything back to earlier sources—the balance between the legislative, executive, and judicial departments; the special duties and powers assigned to each; the methods of operation prescribed; even such features as the electoral college, which was borrowed from Maryland. In particular, the convention profited by the work of the states in making their own constitutions. Between 1775 and 1787 every state except Rhode

Island and Connecticut (which took over their colonial charters) had written at least one constitution, and some had adopted two or three. This experimentation by the states furnished many lessons of profit to the men who met in Philadelphia.

Even before New York ratified, preparations had been made to set the new government in motion. During September, Congress fixed the dates for the choice of presidential electors, the election of the president, and the inauguration of the machinery of administration. Though there was some delay, it was not serious. On Feb. 4, 1789, Washington was elected president, and on April 30, he took the oath of office, and the government was in running order. Soon afterward North Carolina and Rhode Island, the two laggard states, ratified the Constitution, and the circle of the original 13 colonies was completed.

No constitution can long exist without change and growth. Some of the most important alterations in the American Constitution have taken place quietly and without the adding or dropping of a single phrase. They were changes in custom and interpretation. But other changes were brought about by formal amendment, for which the Constitution provides several different methods. In fact, the government had hardly been launched before the first ten amendments were adopted in a body.

The "Bill of Rights"

These first ten amendments form the so-called "Bill of Rights." The makers of the Constitution had considered it unnecessary to forbid some of the elementary invasions of personal liberty and property rights. But the people were not so sure. They remembered the long struggle in England to secure just these rights, and the difficulty in America of protecting them against the crown and the royal governors. Virginia and other states, in ratifying the Constitution, made it plain that they expected a bill of rights to be added, and Madison led the necessary movement in the first Congress. The ten amendments went into effect on Nov. 3, 1791. They provided for freedom of speech, of the press, and of worship; for the right of the states to establish militia; for the security of people in their homes against unreasonable search and seizure; and for trial by jury. Some of these amendments were destined to be important. Particularly so was the tenth amendment, declaring that powers not delegated to the United States by the Constitution, or prohibited to the states, should be reserved to the states or to the people.

The next two amendments, made within ten years, furnished a remedy for defects which experience had brought to light. In 1793 the Supreme Court had held that a citizen of one state could sue another state in the federal courts. This shocked everyone who held strong states' rights views, for it seemed a violation of state sovereignty. In 1795, therefore, the 11th amendment was adopted, declaring that no citizen of a state and no foreigner could hale a state government into the federal courts to be sued. The 12th amend-

ment met a much more serious flaw in the Constitution. It had been provided that the presidential electors should meet in their respective states and vote for two persons, and that the one having the most votes (if a majority) should be president, and the one with the second largest number should be vice-president. This led in 1800 to a tie between Jefferson and Burr, both Democrats, for the presidency, though everyone had understood that Jefferson was to be president and Burr vice-president. This was dangerous and wrong. The 12th amendment, ratified in 1804, therefore provided that the electors should vote for president on one ballot, and for vice-president on another.

Amendments After the Civil War

Until 1865 the country got along with these 12 amendments. But the end of the Civil War made it necessary for the United States to deal with a whole group of questions centering in slavery and the negro. The negro's freedom had to be assured. His rights as a citizen had to be guaranteed. Many Northerners believed that he ought to be given the vote. The result was the ratification of three amendments which defined the place of the negro freedmen in national life, and were practically peace terms imposed on the defeated South. The first, the 13th amendment, declared simply that neither slavery nor involuntary servitude, except as punishment for a crime, should ever exist in the United States. The South, except for the one state of Mississippi, promptly ratified this amendment, and it was proclaimed on Dec. 18, 1865.

The 14th amendment—the "civil rights" amendment—was much more complicated, and was accepted with far greater reluctance. Many Northerners feared that despite the abolition of slavery the negro would soon be reduced to almost his old position—to serfdom or peonage. This fear increased when several Southern states passed laws which greatly restricted the rights of negroes. Congress therefore drafted an amendment which declared that no state should abridge the rights of any citizen of the United States, or "deprive any person of life, liberty, or property without due process of law," or deny any person the equal protection of the laws. In short, the amendment was intended to make sure that the negro would have the same civil rights as the white man. This amendment, which also excluded certain supporters of the Confederacy from holding office, was a bitter dose to the South. But the North was in control of the situation, and it became a part of the Constitution in July 1868.

Meanwhile, the growth of radical feeling in the North on the question of reconstruction, and the desire of the Republicans to gain the negro vote, made Congress insist that the Southern states must give the negro the ballot. They had to do this before they were allowed to send representatives to sit in Congress. But everyone knew that when the crisis was past, the South would abolish negro suffrage. In 1869, therefore, Congress passed the 15th amendment, which declared that the right of citizens to vote should not

be denied on account of race, color, or previous condition of servitude. Much to the anger of most Southern whites, this became a part of the Constitution in March 1870.

Many years passed without any further amendment. Then within a decade, in the Taft and Wilson administrations, four more were added. One, the 16th, enabled Congress to lay an income tax. Such taxes had actually been levied during the Civil War. But when, in the early 90's, Congress passed a new income tax law, the Supreme Court declared it unconstitutional. This produced much indignation, especially in the West. The agitation for an amendment authorizing such a law grew until in February 1913, it became part of the Constitution. This was in good time for the use of income taxes in the World War. In the same year came the 17th amendment, providing that United States senators should be elected by vote of the people instead of the legislatures. It was believed that this would give the country abler and more honest senators.

The 18th and 19th amendments were the products of great popular movements extending over many decades—the movement against liquor, and the women's rights movement. The 18th amendment, prohibiting the manufacture and sale of intoxicating liquor for beverage purposes, was ratified in January 1919 and went into effect a year later. The 19th amendment, giving women the vote, was proclaimed in August 1920.

In 1933 two more amendments were added. The 20th changed the dates when the president and members of Congress take office, thus eliminating the so-called "lame duck" sessions of Congress. The 21st repealed the prohibition amendment (the 18th).

Nearly all of these amendments have been important. But even taken as a whole, they are probably less important than the changes wrought by other means. A constitution must be a living organism, altering as the life and opinions of a nation change. Under the American system there are fortunately two methods, aside from amendments, of steadily adjusting the Constitution to new conditions. One is simply by custom and tradition. It is custom, for example, which has given us a method of electing presidents wholly different from that laid down in the Constitution. It is custom which has made the president's cabinet so important a feature of the government. It is essentially custom, aided by ingenious state laws, which has decided that in spite of the 15th amendment most southern negroes cannot vote.

The Supreme Court and the Constitution

The other method of adjustment is through the interpretations of the Constitution by the Supreme Court. Ever since the days of John Marshall, the Supreme Court has been helping the Constitution to meet the new demands arising from national growth, and bringing it into harmony with great changes in public opinion.

The Constitution is a written document whose

words cannot be changed except by the process of amendment described in Article V. But its meaning is not always the same to the members of two opposing political parties, or to persons engaged in lawsuits over property or human rights. Thus it has been necessary for someone to "interpret" it; that is, to say what it means in any given matter of controversy. This duty is entrusted to the Supreme Court. And it is provided that the Constitution, and the laws made "in pursuance thereof, shall be the supreme law of the land."

Invalidating Acts of Congress

The Supreme Court has therefore two kinds of duty: one, to decide cases of law, the other to decide what the Constitution means. Sometimes people who have been dissatisfied with its decisions have said that the power to determine the meaning of the Constitution ought to be exercised by Congress; but since a law inconsistent with the Constitution cannot be a real law, it must not be enforced. And only the court before which the enforcement of such a law comes can easily make the decision. Early in its history the Supreme Court was obliged to face this situation. In the case of *Marbury vs. Madison* (1803) it declared an act of Congress void because it was repugnant to the Constitution. The power has not often been exercised, but it indicates the difference between the United States government, with a fixed basic law, and a constitutional government such as that of England, in which the constitution at any moment consists of all the laws that have been passed.

The Constitution has twice been amended because the people did not like the interpretation given it by the Supreme Court. After the decision in *Chisholm vs. Georgia* (1793), in which the Court ruled that a state might be sued by a private citizen of another state, the 11th amendment was promptly adopted forbidding this sort of suit. Governments, in general, do not permit themselves to be sued as though they were private individuals. And again, when the income tax of 1894 was declared unconstitutional in *Pollock vs. Farmers Loan and Trust Co.* (1895), the 16th amendment was brought forward to authorize such a tax.

On a third occasion it might have been necessary to amend the Constitution if the Supreme Court had not taken a broad view of its meaning. Jefferson thought the Louisiana Purchase was unconstitutional because the right to acquire territory is not "enumerated" in the Constitution. But the Supreme Court decided, in *American Insurance Co. vs. Canter* (1828) that the right to annex territory may be derived from either the power to declare war, or the power to conclude treaties. At a later date, when the annexation of the Philippines raised the question of the right to govern them, the decision in the *Insular Cases* (1901) upheld the authority of the government.

John Marshall, while chief justice, made many of the most important constitutional decisions, because many cases appeared for him to decide for the first time. Marshall's most important decision came when the

power of Congress to create a national bank was questioned (see *Marshall, John*). Then, in *McCulloch vs. Maryland* (1819), his judgment contained what are perhaps the most important words upon the meaning of the Constitution: "Let the end be legitimate, let it be within the scope of the Constitution, and all means which are appropriate, which are plainly adapted to that end, which are not prohibited, but consist with the letter and spirit of the Constitution, are constitutional." This sentence contains the doctrine of "implied powers." It means that when Congress has power to perform an act, it may use any suitable method that is not explicitly forbidden. In this spirit it has been possible to interpret the clause giving Congress power to regulate commerce among the several states so as to permit an exercise of wide powers over business. More than 100 years ago, the decision in *Gibbons vs. Ogden* (1824) forbade the states to take action interfering with the free use of rivers and harbors. The right to regulate railroad rates by law was established after the decision in *Munn vs. Illinois* (1877). In *Wabash, St. Louis, and Pacific R. R. vs. Illinois* (1886) the Court decided that no such regulation by a state could be sustained if it incidentally fixed part of a rate for an interstate transaction. In the *Northern Securities Case* (1904) a great railroad combination was broken up because its organization was inconsistent with the acts of Congress passed to regulate interstate commerce.

Sometimes the decisions of the Supreme Court have occurred when party feeling has run high. In *Dred Scott vs. Sandford* (1857) the right of a negro to sue

as a citizen was denied; and in this case the justices expressed opinions, not essential to the case itself (*dicta* they are called), that made this *Dred Scott* Decision a means of inflaming opinion before the Civil War (see *Dred Scott Decision*). The Court has been attacked because it upheld the power of Congress to issue the "greenbacks" of the Civil War, in the *Legal Tender Cases* (1871). It was criticized by some when, in *Fletcher vs. Peck* (1810), it upheld the obligation of contracts, and refused to permit even a state to repudiate an obligation that its officers had entered upon. It has recently twice declared unconstitutional laws attempting to regulate the labor of children.

The business of declaring laws unconstitutional is never popular; but if there is to be a written constitution, someone must do it occasionally. With the modern extension of authority of the government over business, and the demand for laws to render new direct services, and to protect women, children, and the weak, many cases arise in which people have not only political convictions but property interests. The Constitution seems sometimes to stand in the road of progress. When the Supreme Court steps in, it must always defeat the hope of one side or the other and thus gain unpopularity for the moment.

It was for this reason, so that judges might be independent, and not fearful that unpopular decisions might result in their dismissal, that the Constitution provides that federal judges shall hold office during good behavior. They can be removed only after impeachment and conviction for a crime or misdemeanor.

*The Text of the Constitution**

We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defence, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.

Article. I.

Section. 1. All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Section. 2. The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors of the most numerous Branch of the State Legislature.

No Person shall be a Representative who shall not have attained to the Age of twenty five Years, and been seven Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.

Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term

of Years, and excluding Indians not taxed, three fifths of all other Persons. The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The Number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to chuse three, Massachusetts eight, Rhode-Island and Providence Plantations one, Connecticut five, New-York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

When vacancies happen in the Representation from any State, the Executive Authority thereof shall issue Writs of Election to fill such Vacancies.

The House of Representatives shall chuse their Speaker and other Officers; and shall have the sole Power of Impeachment.

Section. 3. The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for six Years; and each Senator shall have one Vote.

Immediately after they shall be assembled in Consequence of the first Election, they shall be divided as

*Text taken from the literal print issued by the Department of State.

equally as may be into three Classes. The Seats of the Senators of the first Class shall be vacated at the Expiration of the second Year, of the second Class at the Expiration of the fourth Year, and of the third Class at the Expiration of the sixth Year, so that one third may be chosen every second Year; and if Vacancies happen by Resignation, or otherwise, during the Recess of the Legislature of any State, the Executive thereof may make temporary Appointments until the next Meeting of the Legislature, which shall then fill such Vacancies.

No Person shall be a Senator who shall not have attained to the Age of thirty Years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State for which he shall be chosen.

The Vice President of the United States shall be President of the Senate, but shall have no Vote, unless they be equally divided.

The Senate shall chuse their other Officers, and also a President pro tempore, in the Absence of the Vice President, or when he shall exercise the Office of President of the United States.

The Senate shall have the sole Power to try all Impeachments. When sitting for that Purpose, they shall be on Oath or Affirmation. When the President of the United States is tried the Chief Justice shall preside: And no Person shall be convicted without the Concurrence of two thirds of the Members present.

Judgment in Cases of Impeachment shall not extend further than to removal from Office, and disqualification to hold and enjoy any Office of honor, Trust or Profit under the United States: but the Party convicted shall nevertheless be liable and subject to Indictment, Trial, Judgment and Punishment, according to Law.

Section. 4. The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Places of chusing Senators.

The Congress shall assemble at least once in every Year, and such Meeting shall be on the first Monday in December, unless they shall by Law appoint a different Day.

Section. 5. Each House shall be the Judge of the Elections, Returns and Qualifications of its own Members, and a Majority of each shall constitute a Quorum to do Business; but a smaller Number may adjourn from day to day, and may be authorized to compel the Attendance of absent Members, in such Manner, and under such Penalties as each House may provide.

Each House may determine the Rules of its Proceedings, punish its Members for disorderly Behaviour, and, with the Concurrence of two thirds, expel a Member.

Each House shall keep a Journal of its Proceedings, and from time to time publish the same, excepting such Parts as may in their Judgment require Secrecy; and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal.

Neither House, during the Session of Congress, shall, without the Consent of the other, adjourn for more than three days, nor to any other Place than that in which the two Houses shall be sitting.

Section. 6. The Senators and Representatives shall receive a Compensation for their Services, to be ascertained

by Law, and paid out of the Treasury of the United States. They shall in all Cases, except Treason, Felony and Breach of the Peace, be privileged from Arrest during their Attendance at the Session of their respective Houses, and in going to and returning from the same; and for any Speech or Debate in either House, they shall not be questioned in any other Place.

No Senator or Representative shall, during the Time for which he was elected, be appointed to any civil Office under the Authority of the United States, which shall have been created, or the Emoluments whereof shall have been increased during such time; and no Person holding any Office under the United States, shall be a Member of either House during his Continuance in Office.

Section. 7. All Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills.

Every Bill which shall have passed the House of Representatives and the Senate, shall, before it become a Law, be presented to the President of the United States; If he approve he shall sign it, but if not he shall return it, with his Objections to that House in which it shall have originated, who shall enter the Objections at large on their Journal, and proceed to reconsider it. If after such Reconsideration two thirds of that House shall agree to pass the Bill, it shall be sent, together with the Objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a Law. But in all such Cases the Votes of both Houses shall be determined by yeas and Nays, and the Names of the Persons voting for and against the Bill shall be entered on the Journal of each House respectively. If any Bill shall not be returned by the President within ten Days (Sundays excepted) after it shall have been presented to him, the Same shall be a Law, in like Manner as if he had signed it, unless the Congress by their Adjournment prevent its Return, in which Case it shall not be a Law.

Every Order, Resolution, or Vote to which the Concurrence of the Senate and House of Representatives may be necessary (except on a question of Adjournment) shall be presented to the President of the United States; and before the Same shall take Effect, shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the Rules and Limitations prescribed in the Case of a Bill.

Section. 8. The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States; but all Duties, Imposts and Excises shall be uniform throughout the United States;

To borrow Money on the credit of the United States; To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes;

To establish a uniform Rule of Naturalization, and uniform Laws on the subject of Bankruptcies throughout the United States;

To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures;

To provide for the Punishment of counterfeiting the Securities and current Coin of the United States;

To establish Post Offices and post Roads;

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the

exclusive Right to their respective Writings and Discoveries;

To constitute Tribunals inferior to the supreme Court;
To define and punish Piracies and Felonies committed on the high Seas, and Offences against the Law of Nations;

To declare War, grant Letters of Marque and Reprisal, and make Rules concerning Captures on Land and Water;

To raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years;

To provide and maintain a Navy;

To make Rules for the Government and Regulation of the land and naval Forces;

To provide for calling forth the Militia to execute the Laws of the Union, suppress Insurrections and repel Invasions;

To provide for organizing, arming, and disciplining, the Militia, and for governing such Part of them as may be employed in the Service of the United States, reserving to the States respectively, the Appointment of the Officers, and the Authority of training the Militia according to the discipline prescribed by Congress;

To exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States, and to exercise like Authority over all Places purchased by the Consent of the Legislature of the State in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, dock-Yards, and other needful Buildings;—And

To make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or in any Department or Officer thereof.

Section. 9. The Migration or Importation of such Persons as any of the States now existing shall think proper to admit, shall not be prohibited by the Congress prior to the Year one thousand eight hundred and eight, but a Tax or duty may be imposed on such Importation, not exceeding ten dollars for each Person.

The Privilege of the Writ of Habeas Corpus shall not be suspended, unless when in Cases of Rebellion or Invasion the public Safety may require it.

No Bill of Attainder or ex post facto Law shall be passed.

No Capitation, or other direct, Tax shall be laid, unless in Proportion to the Census or Enumeration herein before directed to be taken.

No Tax or Duty shall be laid on Articles exported from any State.

No Preference shall be given by any Regulation of Commerce or Revenue to the Ports of one State over those of another: nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another.

No Money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law; and a regular Statement and Account of the Receipts and Expenditures of all public Money shall be published from time to time.

No Title of Nobility shall be granted by the United States: And no Person holding any Office of Profit or Trust under them, shall, without the Consent of the Congress, accept of any present, Emolument, Office, or

Title, of any kind whatever, from any King, Prince, or foreign State.

Section. 10. No State shall enter into any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; coin Money; emit Bills of Credit; make any Thing but gold and silver Coin a Tender in Payment of Debts; pass any Bill of Attainder, ex post facto Law, or Law impairing the Obligation of Contracts, or grant any Title of Nobility.

No State shall, without the Consent of the Congress, lay any Imposts or Duties on Imports or Exports, except what may be absolutely necessary for executing it's inspection Laws: and the net Produce of all Duties and Imposts, laid by any State on Imports or Exports, shall be for the Use of the Treasury of the United States; and all such Laws shall be subject to the Revision and Controul of the Congress.

No State shall, without the Consent of Congress, lay any Duty of Tonnage, keep Troops, or Ships of War in time of Peace, enter into any Agreement or Compact with another State, or with a foreign Power, or engage in War, unless actually invaded, or in such imminent Danger as will not admit of delay.

Article. II.

Section. 1. The executive Power shall be vested in a President of the United States of America. He shall hold his Office during the Term of four Years, and, together with the Vice President, chosen for the same Term, be elected, as follows

Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress: but no Senator or Representative, or Person holding an Office of Trust or Profit under the United States, shall be appointed an Elector.

The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves. And they shall make a List of all the Persons voted for, and of the Number of Votes for each; which List they shall sign and certify, and transmit sealed to the Seat of Government of the United States, directed to the President of the Senate. The President of the Senate shall, in the Presence of the Senate and House of Representatives, open all the Certificates, and the Votes shall then be counted. The Person having the greatest Number of Votes shall be the President, if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately chuse by Ballot one of them for President; and if no Person have a Majority, then from the five highest on the List the said House shall in like Manner chuse the President. But in chusing the President, the Votes shall be taken by States, the Representation from each State having one Vote; A quorum for this Purpose shall consist of a Member or Members from two thirds of the States, and a Majority of all the States shall be necessary to a Choice. In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President. But if there should remain two or more who have equal Votes, the Senate shall chuse from them by Ballot the Vice President.

The Congress may determine the Time of chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.

No Person except a natural born Citizen, or a Citizen of the United States, at the time of the Adoption of this Constitution, shall be eligible to the Office of President; neither shall any Person be eligible to that Office who shall not have attained to the Age of thirty five Years, and been fourteen Years a Resident within the United States.

In Case of the Removal of the President from Office, or of his Death, Resignation, or Inability to discharge the Powers and Duties of the said Office, the Same shall devolve on the Vice President, and the Congress may by Law provide for the Case of Removal, Death, Resignation or Inability, both of the President and Vice President declaring what Officer shall then act as President, and such Officer shall act accordingly, until the Disability be removed, or a President shall be elected.

The President shall, at stated Times, receive for his Services, a Compensation, which shall neither be encreased nor diminished during the Period for which he shall have been elected, and he shall not receive within that Period any other Emolument from the United States, or any of them.

Before he enter on the Execution of his Office, he shall take the following Oath or Affirmation:—"I do solemnly swear (or affirm) that I will faithfully execute the Office of President of the United States, and will to the best of my Ability, preserve, protect and defend the Constitution of the United States."

Section. 2. The President shall be Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States; he may require the Opinion, in writing, of the principal Officer in each of the executive Departments, upon any Subject relating to the Duties of their respective Offices, and he shall have Power to grant Reprieves and Pardons for Offences against the United States, except in Cases of Impeachment.

He shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur; and he shall nominate, and by and with the Advice and Consent of the Senate, shall appoint Ambassadors, other public Ministers and Consuls, Judges of the supreme Court, and all other Officers of the United States, whose Appointments are not herein otherwise provided for, and which shall be established by Law: but the Congress may by Law vest the Appointment of such inferior Officers, as they think proper, in the President alone, in the Courts of Law, or in the Heads of Departments.

The President shall have Power to fill up all Vacancies that may happen during the Recess of the Senate, by granting Commissions which shall expire at the End of their next Session.

Section. 3. He shall from time to time give to the Congress Information of the State of the Union, and recommend to their Consideration such Measures as he shall judge necessary and expedient; he may, on extraordinary Occasions, convene both Houses, or either of them, and in Case of Disagreement between them, with Respect to the Time of Adjournment, he may adjourn them to such Time as he shall think proper; he shall receive Ambassadors and other public Ministers; he shall take Care that

the Laws be faithfully executed, and shall Commission all the Officers of the United States.

Section. 4. The President, Vice President and all civil Officers of the United States, shall be removed from Office on Impeachment for, and Conviction of, Treason, Bribery, or other high Crimes and Misdemeanors.

Article. III.

Section. 1. The judicial Power of the United States, shall be vested in one supreme Court, and in such inferior Courts as the Congress may from time to time ordain and establish. The Judges, both of the supreme and inferior Courts, shall hold their Offices during good Behaviour, and shall, at stated Times, receive for their Services, a Compensation which shall not be diminished during their Continuance in Office.

Section. 2. The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, and Treaties made, or which shall be made, under their Authority;—to all Cases affecting Ambassadors, other public Ministers and Consuls;—to all Cases of admiralty and maritime Jurisdiction;—to Controversies to which the United States shall be a Party;—to Controversies between two or more States;—between a State and Citizens of another State;—between Citizens of different States,—between Citizens of the same State claiming Lands under Grants of different States, and between a State, or the Citizens thereof, and foreign States, Citizens or Subjects.

In all Cases affecting Ambassadors, other public Ministers and Consuls, and those in which a State shall be Party, the supreme Court shall have original Jurisdiction. In all the other Cases before mentioned, the supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such Regulations as the Congress shall make.

The Trial of all Crimes, except in Cases of Impeachment, shall be by Jury; and such Trial shall be held in the State where the said Crimes shall have been committed; but when not committed within any State, the Trial shall be at such Place or Places as the Congress may by Law have directed.

Section. 3. Treason against the United States, shall consist only in levying War against them, or in adhering to their Enemies, giving them Aid and Comfort. No Person shall be convicted of Treason unless on the Testimony of two Witnesses to the same overt Act, or on Confession in open Court.

The Congress shall have Power to declare the Punishment of Treason, but no Attainder of Treason shall work Corruption of Blood, or Forfeiture except during the Life of the Person attainted.

Article. IV.

Section. 1. Full Faith and Credit shall be given in each State to the public Acts, Records, and judicial Proceedings of every other State. And the Congress may by general Laws prescribe the Manner in which such Acts, Records and Proceedings shall be proved, and the Effect thereof.

Section. 2. The Citizens of each State shall be entitled to all Privileges and Immunities of Citizens in the several States.

A Person charged in any State with Treason, Felony, or other Crime, who shall flee from Justice, and be found in another State, shall on Demand of the executive Authority of the State from which he fled, be delivered

up, to be removed to the State having Jurisdiction of the Crime.

No Person held to Service or Labour in one State, under the Laws thereof, escaping into another, shall, in Consequence of any Law or Regulation therein, be discharged from such Service or Labour, but shall be delivered up on Claim of the Party to whom such Service or Labour may be due.

Section. 3. New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the Jurisdiction of any other State; nor any State be formed by the Junction of two or more States, or Parts of States, without the Consent of the Legislatures of the States concerned as well as of the Congress.

The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State.

Section. 4. The United States shall guarantee to every State in this Union a Republican Form of Government, and shall protect each of them against Invasion; and on Application of the Legislature, or of the Executive (when the Legislature cannot be convened) against domestic Violence.

Article. V.

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose Amendments to this Constitution, or, on the Application of the Legislatures of two thirds of the several States, shall call a Convention for proposing Amendments, which, in either Case, shall be valid to all Intents and Purposes, as Part of this Constitution, when ratified by the Legislatures of three fourths of the several States, or by Conventions in three

fourths thereof, as the one or the other Mode of Ratification may be proposed by the Congress; Provided that no Amendment which may be made prior to the Year One thousand eight hundred and eight shall in any Manner affect the first and fourth Clauses in the Ninth Section of the first Article; and that no State, without its Consent, shall be deprived of its equal Suffrage in the Senate.

Article. VI.

All Debts contracted and Engagements entered into, before the Adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

The Senators and Representatives before mentioned, and the Members of the several State Legislatures, and all executive and judicial Officers, both of the United States and of the several States, shall be bound by Oath or Affirmation, to support this Constitution; but no religious Test shall ever be required as a Qualification to any Office or public Trust under the United States.

Article. VII.

The Ratification of the Conventions of nine States, shall be sufficient for the Establishment of this Constitution between the States so ratifying the Same.

done in Convention by the Unanimous Consent of the States present the Seventeenth Day of September in the Year of our Lord one thousand seven hundred and Eighty seven and of the Independence of the United States of America the Twelfth In witness whereof We have hereunto subscribed our Names,

Attest WILLIAM JACKSON Secretary G^o WASHINGTON—Presid^t and deputy from Virginia

New Hampshire . . .	{ JOHN LANGDON NICHOLAS GILMAN }
Massachusetts . . .	{ NATHANIEL GORHAM RUFUS KING }
Connecticut	{ WM SAM ^l JOHNSON ROGER SHERMAN }
New York	{ ALEXANDER HAMILTON WIL ^l LIVINGSTON }
New Jersey	{ DAVID BREARLEY. WM PATERSON. JONA ^s DAYTON }
	{ B FRANKLIN THOMAS MIFFLIN ROB ^t MORRIS }
Pennsylvania . . .	{ GEO. CLYMER THO ^s FITZSIMONS JARED INGERBOLL JAMES WILSON GOUV MORRIS }

Delaware	{ GEO ^o READ GUNNING BEDFORD jun JOHN DICKINSON RICHARD BASSETT JACO ^s BROOM }
Maryland	{ JAMES M ^o HENRY DAN ^o OF ST THO ^s JENIFER DAN ^l CARROLL }
Virginia	{ JOHN BLAIR— JAMES MADISON Jr. WM BLOUNT }
North Carolina . . .	{ RICH ^d DOBBS SPAIGHT. HU WILLIAMSON J. RUTLEDGE }
South Carolina . . .	{ CHARLES COTESWORTH PINCKNEY CHARLES PINCKNEY PIEROE BUTLER. }
Georgia	{ WILLIAM FEW ABR BALDWIN }

Amendments to the Constitution

Articles in addition to, and Amendment of the Constitution of the United States of America, proposed by Congress, and ratified by the Legislatures of the several States, pursuant to the fifth Article of the Original Constitution.

AMENDMENT 1.

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof;

or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

AMENDMENT 2.

A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed.

AMENDMENT 3.

No Soldier shall, in time of peace be quartered in any house, without the consent of the Owner, nor in time of war, but in a manner to be prescribed by law.

AMENDMENT 4.

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

AMENDMENT 5.

No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

AMENDMENT 6.

In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the Assistance of Counsel for his defence.

AMENDMENT 7.

In Suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise re-examined in any Court of the United States, than according to the rules of the common law.

AMENDMENT 8.

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

AMENDMENT 9.

The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

AMENDMENT 10.

The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

AMENDMENT 11.

The Judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by Citizens of another State, or by Citizens or Subjects of any Foreign State.

AMENDMENT 12.

The Electors shall meet in their respective states, and vote by ballot for President and Vice-President, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots

the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which list they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate;—The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted;—The person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of Electors appointed; and if no person have such majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President.—The person having the greatest number of votes as Vice-President, shall be the Vice-President, if such number be a majority of the whole number of Electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

AMENDMENT 13.

Section. 1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Section. 2. Congress shall have power to enforce this article by appropriate legislation.

AMENDMENT 14.

Section. 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

Section. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the United States, Representatives in Congress, the Executive and Judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion, or

other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

Section. 3. No person shall be a Senator or Representative in Congress, or elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may by a vote of two-thirds of each House, remove such disability.

Section. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations and claims shall be held illegal and void.

Section. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

AMENDMENT 15.

Section. 1. The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude—

Section. 2. The Congress shall have power to enforce this article by appropriate legislation—

AMENDMENT 16.

The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration.

AMENDMENT 17.

The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof, for six years; and each Senator shall have one vote. The electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislatures.

When vacancies happen in the representation of any State in the Senate, the executive authority of such State shall issue writs of election to fill such vacancies: *Provided*, That the legislature of any State may empower the executive thereof to make temporary appointments until the people fill the vacancies by election as the legislature may direct.

This amendment shall not be so construed as to affect the election or term of any Senator chosen before it becomes valid as part of the Constitution.

AMENDMENT 18.

SECTION 1. After one year from the ratification of this article the manufacture, sale, or transportation of intoxicating liquors within, the importation thereof into, or

the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited.

SEC. 2. The Congress and the several States shall have concurrent power to enforce this article by appropriate legislation.

SEC. 3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

AMENDMENT 19.

The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex.

Congress shall have power to enforce this article by appropriate legislation.

AMENDMENT 20.

Section 1. The terms of the President and Vice President shall end at noon on the 20th day of January, and the terms of Senators and Representatives at noon on the 3d day of January, of the years in which such terms would have ended if this article had not been ratified; and the terms of their successors shall then begin.

Sec. 2. The Congress shall assemble at least once in every year, and such meeting shall begin at noon on the 3d day of January, unless they shall by law appoint a different day.

Sec. 3. If, at the time fixed for the beginning of the term of the President, the President elect shall have died, the Vice President elect shall become President. If a President shall not have been chosen before the time fixed for the beginning of his term, or if the President elect shall have failed to qualify, then the Vice President elect shall act as President until a President shall have qualified; and the Congress may by law provide for the case wherein neither a President elect nor a Vice President elect shall have qualified, declaring who shall then act as President, or the manner in which one who is to act shall be selected, and such person shall act accordingly until a President or Vice President shall have qualified.

Sec. 4. The Congress may by law provide for the case of the death of any of the persons from whom the House of Representatives may choose a President whenever the right of choice shall have devolved upon them, and for the case of the death of any of the persons from whom the Senate may choose a Vice President whenever the right of choice shall have devolved upon them.

Sec. 5. Sections 1 and 2 shall take effect on the 15th day of October following the ratification of this article.

Sec. 6. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of three-fourths of the several States within seven years from the date of its submission.

AMENDMENT 21.

Section 1. The eighteenth article of amendment to the Constitution of the United States is hereby repealed.

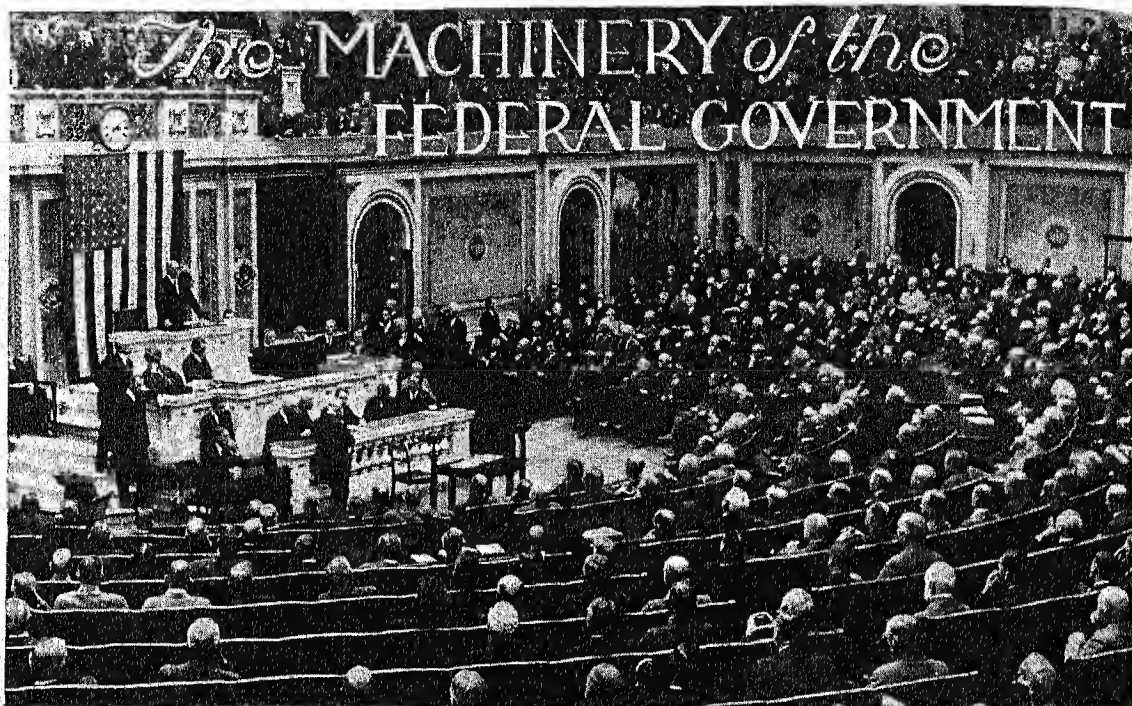
Sec. 2. The transportation or importation into any State, Territory, or possession of the United States for delivery or use therein of intoxicating liquors, in violation of the laws thereof, is hereby prohibited.

Sec. 3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by conventions in the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

THE SHRINE OF TWO GREAT DOCUMENTS



In the Library of Congress, at Washington, D.C., are usually kept the original documents of the Declaration of Independence and the Constitution of the United States. The Declaration of Independence is in the wall cabinet, protected from fading by yellow glass, while the floor case holds the Constitution. During the second World War they were removed to an undisclosed hiding place.



In the House of Representatives—The Speaker Calls the House to Order

UNITED STATES GOVERNMENT. The government devised by the makers of the Federal Constitution was unlike that of any other country of that time, though the founders built in part on English precedents and their own colonial experience. According to this Constitution the central government controls only certain matters mentioned in that document. Things that are purely local in their nature they left in the main under the control of the several states. Usually in speaking of the government of the United States we refer only to the affairs of the Federal government centered at Washington.

Checks and Balances

The makers of the Constitution went further than merely dividing powers between the states and the nation. As stated in the article on the Constitution, they divided the authority of the nation among three distinct departments equal in importance—the legislative, the executive, and the judicial; and to guard against one's encroaching on another they devised an elaborate system of checks and balances. The chief executive can check by veto the hasty legislation of Congress. In return Congress can interfere with executive policies by refusing to vote the money to carry out the president's plans, by withholding the necessary approval of the Senate to the president's appointments, and finally by impeaching and trying the president for "treason, bribery, or other high crimes and misdemeanors" (see Impeachment). The judiciary has a check on the president and Congress by its power to declare their acts unconstitutional.

It in turn is subject to check by the president and Congress both through impeachment and through their powers to reduce or increase the number of judges.

The organization and functions of the judicial and the legislative branches of the Federal government are described in the articles Congress of the United States and Courts of Justice.

Vast Increase in Federal Activities

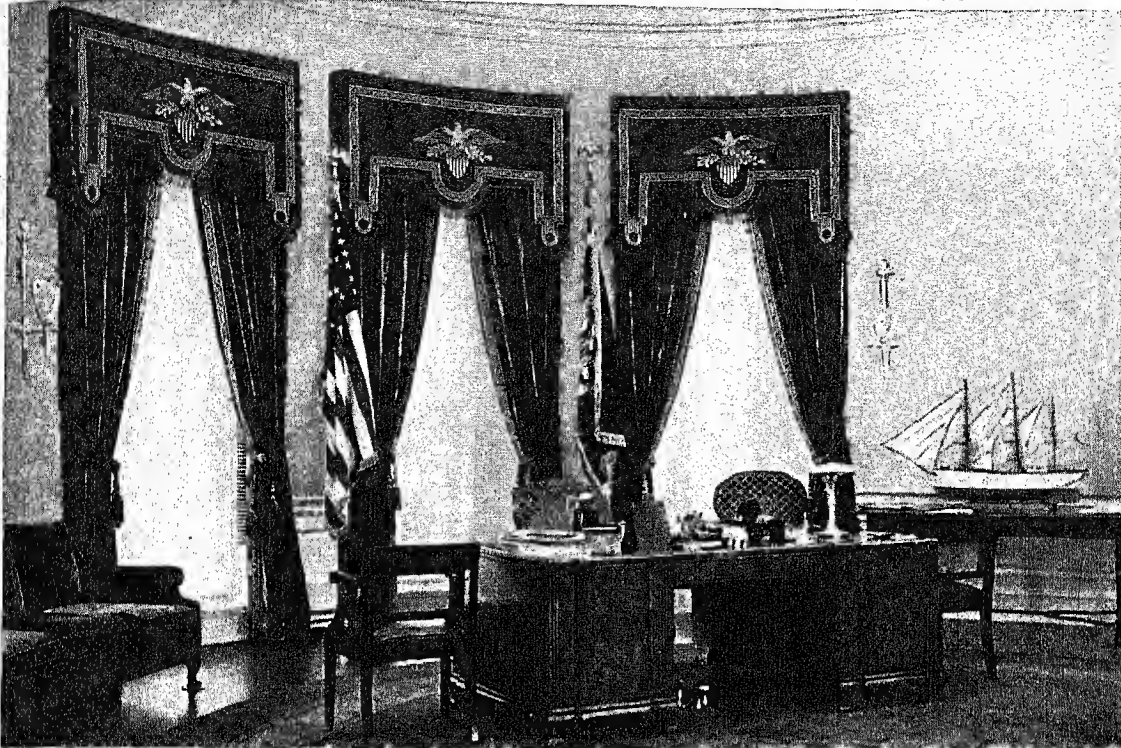
By inevitable growth the United States government today performs functions never dreamed of by the Philadelphia convention. It is engaged in irrigation projects and other activities in areas that in 1789 were foreign soil. It appropriates money to aid education in the states, promotes child welfare, and works for the welfare of women in industry. It guards the health of the whole nation, watches the purity of food and drugs, regulates interstate commerce, and tries to settle disputes between employers and workers. The government aids the farmer, the manufacturer, and the merchant by studying their problems and at times lending them money, directly or indirectly. It controls radio stations, maintains airways and postal savings banks, provides insurance for war veterans, and participates in much of the nation's banking.

The Branches of Government

The huge machine of Federal government normally requires the services of about a million men and women, and the expenditure of several billions of dollars each year.

The largest governmental department is the executive branch, consisting of the president, the heads of

THE ROOM IN WHICH THE PRESIDENT WORKS



This is the President's office, in the executive wing which was added to the White House during President Theodore Roosevelt's administration and modernized by Franklin D. Roosevelt. It has the simplicity and dignity of a room in a private home.

the State, Treasury, War, and other departments (who also form the Cabinet which advises the president), and everyone employed in these departments. This branch shows most clearly how the government has grown. True, Congress has many more members than it did in 1789, but this increase is needed to represent the many more people and states. We have more federal courts and judges for the same reason. But while the executive branch has increased in numbers because of increased population, it has grown still more because of the new duties it has undertaken.

Many of these duties are performed by independent agencies responsible only to the president, to Congress, or to both. The business depression starting in 1929 caused a vast increase in such agencies, and many of them are described elsewhere (see Roosevelt, Franklin D.). But the executive departments, which provide the framework for most executive activity, also have increased tremendously:

Ten Great Executive Departments

There are ten great executive departments, each under a member of the Cabinet. In Washington's time there were only four, and four Cabinet officers—the secretaries of state, of the treasury, and of war, and the attorney general.

By the Presidential Succession Act of 1886, in the event of the death or incapacity of the president and vice-president, the office of acting president would pass first to the secretary of state; if he should be

unable to act it would pass in order to the secretary of the treasury, the secretary of war, the attorney general, the postmaster general, the secretary of the navy, and the secretary of the interior.

I. THE DEPARTMENT OF STATE

Although all intercourse between the United States government and foreign governments is carried on by or under direction of the president, he always acts through the secretary of state, who is, under the law, his chief adviser in such affairs. The Department of State, with its field agents in the Foreign Service, is the official link between the United States and other countries. It provides the government with exact information and expert advice that decide important matters affecting relations with other nations. This department employs the smallest force of any department of the Federal government, but it is first in rank. Few American citizens have any direct contact with this department unless they apply for a passport for foreign travel (see Passport).

In Washington, directly subordinate to the secretary of state are the undersecretary and the four assistant secretaries. The undersecretary is the principal assistant of the head of the department, is acting secretary in the latter's absence, and is in general charge of the department's activities. Each of the assistant secretaries is responsible for particular bureaus and divisions. There are four geographic divisions: Far Eastern, American Republics, Euro-

pean, and Near Eastern, as well as an Office of Philippine Affairs and a Caribbean Office. Each has its chief and a staff of specialists who have had personal experience in the regions under their direction. They receive the reports of diplomatic and consular officers in their respective areas, and supervise the political and economic relations with the countries assigned to them.

Most of the employees of the Department of State reside abroad, as members of the Foreign Service. This was created in 1924, merging the diplomatic and consular services. All foreign officers now hold both diplomatic and consular commissions (see Diplomatic Service). Admission to the Foreign Service is by examination. New appointees take a four months' intensive course in the Foreign Service School, where they study such specialized problems as international law, trade practices, and treaty procedure.

A vast mass of information comes to the department in Washington from these foreign representatives. An important part of it has to do with trade conditions throughout the world. Through its commercial and economic reports, its trade letters, and its aid and advice to traveling representatives of American business houses, the Foreign Service creates and protects new markets for American goods abroad. The foreign services of the Department of Agriculture and the Department of Commerce were transferred to the State Department in 1939. These two departments maintain officers in the Foreign Service to represent their special interests. The Foreign Service protects Americans abroad. It also keeps records of marriages of Americans and the birth of American children in foreign lands.

Divisions of the State Department

The rapidly expanding and varied relations of the United States with other countries are handled by

the State Department in specialized divisions. The Division of Commercial Affairs directs the trade-promotion work of the department and seeks to expand the markets for American products. The Treaty Division drafts, negotiates, and interprets the agreements with foreign countries. The Division of Cul-

tural Relations encourages intellectual coöperation with other countries. Its work embraces the exchange of educators and students; the establishment of libraries and research facilities; the dissemination abroad of the representative art, music, and literature of the United States; and participation in international radio broadcasts and in expositions.

The Division of International Communications deals with the international aspects of shipping, aviation, and radio. The many problems created by the second World War are handled by the Board of Economic Operations. Under the Board are the Financial Division,

and the Divisions of Commercial Policy and Agreements, Exports and Defense Aid, Defense Materials, Foreign Funds Control, World Trade Intelligence, and Studies and Statistics. The Division of Current Information distributes to the press, radio, and newsreels information regarding the activities and policies of the department. Political and economic advisers and a legal adviser lend special assistance.

The State Department is also the medium of correspondence between the Federal and the state governments. It publishes federal laws as well as treaties and other international acts and is the custodian of the Great Seal. It has an extensive library, started by Thomas Jefferson in 1789.

II. THE DEPARTMENT OF THE TREASURY

When we think of the Treasury Department we immediately think of money, for the department is best known in this connection. Coins are made in the mint,

WHAT IS AMERICANISM?

Washington defined it when he said: "This government, the offspring of our own choice, uninfluenced and unawed, adopted upon full investigation, completely free in its principles, in the distribution of its power, uniting security with energy, and containing within itself a provision for its own amendment, has a just claim to your confidence and your support. Respect for its authority, compliance with its laws, acquiescence in its measures, are duties enjoined by the fundamental maxims of true liberty."

Jefferson explained its meaning when he wrote into the Declaration of Independence: "We hold these truths to be self-evident—that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed."

Lincoln gave his idea of it when he spoke of "a new nation conceived in liberty and dedicated to the proposition that all men are created equal," and again when he talked of a "government of the people, by the people, for the people."

Daniel Webster expressed the same idea in these words: "I hold it to be a popular government, erected by the people; those who administer it responsible to the people; and itself capable of being amended and modified just as the people may choose it should be."

Theodore Roosevelt defined it thus: "Our country—this great republic means nothing unless it means the triumph of a real democracy, the triumph of popular government, and in the long run, of an economic system under which each man shall be guaranteed the opportunity to show the best that there is in him."

Wilson said practically the same thing when he spoke of a "great free republic based upon traditions of personal liberty," and when he added: "Freedom today is something more than being let alone. The program of a government freedom in these days must be positive, not negative merely."

and the Bureau of Engraving and Printing makes paper money, government securities, and postage and revenue stamps (see Mint, United States; Money). In underground vaults at Fort Knox, Ky., the Treasury stores billions of dollars' worth of monetary gold. There is a silver deposit vault at West Point, N. Y.

The Constitution provides that Congress "shall have power to lay and collect taxes, duties, imposts, and excises." The Bureau of Internal Revenue

collects federal taxes and excises (see Taxation). It also supervises the government's liquor laws. The Customs Bureau collects import duties. When necessary, the Treasury arranges to borrow money. It advertises and sells government bonds authorized by Congress and disburses all sums ordered by Congress. It is responsible for the state of the nation's credit; it recommends to Congress plans for increasing the revenue

by taxation; it conducts research into monetary and tax problems; and it outlines fiscal policies.

Chief Treasury Officials

The secretary of the treasury ranks next to the secretary of state in the Cabinet. He is assisted in the management of the department's numerous branches by an undersecretary, a general counsel, and three assistant secretaries.

The offices of the comptroller of the currency and the fiscal assistant secretary are among the principal divisions of the department. The comptroller of the currency supervises the national banks, grants charters for new ones, and names receivers for those shown by examination to be insolvent. The Federal Deposit Insurance Corporation (FDIC) becomes the receiver for banks having deposit insurance.

The fiscal assistant secretary is head of the Fiscal Service, which consists of the Office of the Treasurer of the United States, the Bureau of Accounts, and the Bureau of Public Debt.

The Secret Service is also an important branch of the Treasury Department. Its duties are to protect the president and the president-elect and their families; to guard the currency against counterfeiting; and to make any special investigations directed by the secretary. Secret Service men attend all social functions at the White House, and guard visiting rulers and executives of foreign nations. Other branches of the department are the Bureau of Narcotics (see

Narcotics), and the Coast Guard, which in 1939 absorbed the Lighthouse Bureau (see Coast Guard; Lighthouses and Lightships).

III. THE DEPARTMENT OF JUSTICE

The attorney general heads the Department of Justice, which provides for the enforcement of federal laws, furnishes legal counsel in federal cases, and interprets the laws under which other departments act.

The solicitor general usually represents the government before the Supreme Court. The assistant to the attorney general supervises the district attorneys and marshals and the major units of the department. Each of the assistant attorneys general has charge of a division dealing with certain groups of cases. These divisions deal severally with antitrust and interstate commerce cases; tax suits; criminal suits; suits relating to copyright, patents, and bank-

ruptcy; public lands; customs; and war veterans' claims. The director of prisons supervises federal prisons.

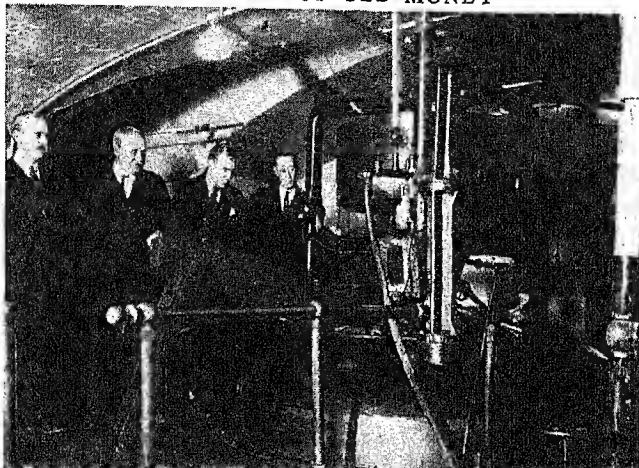
The Federal Bureau of Investigation handles crimes against federal laws which come within the department's jurisdiction. Its agents have gained wide publicity under the popular title of "G-men" since laws were passed in 1934 making federal crimes of offenses such as kidnaping and flight from justice across state lines. In addition to its own work, the bureau lends powerful aid to other law-enforcement agencies through its laboratories for crime detection, its file of information, and particularly its finger-print file. Here it seeks to keep the finger-prints of every known criminal for identification of finger-prints sent in by any law-enforcement agency. The investigation of espionage and sabotage is an important part of its work.

The Immigration and Naturalization Service was transferred from the Department of Labor to the Department of Justice in 1940. It admits all aliens at the various ports of entry, and has charge of their registration and naturalization. It may also deport undesirable aliens. The Border Patrol of the Immigration Service stands guard along the inland borders of the country to prevent smuggling of aliens. (See Immigration.)

IV. THE WAR DEPARTMENT

The War Department, which is headed by the secretary of war, employs more men than any other

GRINDING UP OLD MONEY



Old paper money, too dirty and ragged to remain in circulation, is cut and ground to pieces in this machine at Washington, D.C. To avoid all possibility of saving any of the bills, they are first cut in half, and the separate halves are ground to pieces at different times under official eyes so that they can never be presented for redemption.

branch. The main duty of the department is to maintain armed land and air forces for the protection of the nation's security and interests. To do this the department has two kinds of employees. The first consists of officers and soldiers of the Army, who serve under military discipline (*see Army*). The second consists of civilian, or nonmilitary, employees. These include office employees, arsenal and supply-depot workers, and workers on engineering projects.

The secretary of war, who is always a civilian, controls the civilian employees through assistant secretaries and administrative assistants. These assistants supervise Army activities to see that they conform with law, operate the Panama Canal, and have charge of the civilian workers in Army manufacturing and engineering projects.

The Armed Forces

The secretary of war, acting under the president as commander in chief, controls the armed forces through his military assistant, the chief of staff. Thus the civil authorities always control the Army. Usually the chief of staff acts as commanding general of the field forces; but in time of war the president may name a separate commanding general.

The first duty of the chief of staff is to know the military needs of the country and to have plans ready for meeting them. To do this work he has a General Staff, formed in five divisions:

G-1—*Personnel*: handles procurement, assignment, promotion, and discharge of officers and soldiers;

G-2—*Military Intelligence*: obtains information about theaters of war, and the armed strength and resources of all nations;

G-3—*Operations and Training*: plans and supervises Army organization and training, and maintains schools;

G-4—*Supply*: plans procurement of equipment and supplies, and transportation by land, by sea, and by air;

G-5—*War Plans*: prepares strategic plans for war.

In time of peace, the chief of staff works with the civilian administrators to obtain equipment and supplies through such military services as the Quartermaster and Ordnance departments. Some material is bought from outside sources; but the Army also has its own *arsenals*, or establishments for manufacturing arms, equipment, and other material. It also has *depots*, or storage places, and *posts*, or establishments for troops. Posts are often called *forts*, although a fort, properly speaking, has fortifications. A post with more or less temporary shelters is often called a *cantonment*.

In time of war, most of the work of procuring equipment and supplies is entrusted to civilian experts, and the Army handles the material after delivery.

The armed services are divided into Ground Forces, Air Forces, and Army Service Forces. The last division produces the vast amount of equipment used by an army in peace and in war. For administrative purposes it is divided into nine Service Commands, with headquarters as follows:

First Service Command, Boston; 2d, Governor's Island, N.Y.; 3d, Baltimore; 4th, Atlanta; 5th, Columbus, Ohio; 6th, Chicago; 7th, Omaha; 8th, San Antonio; 9th, San Francisco and Salt Lake City.

In peacetime Overseas Departments are maintained for Hawaii, the Philippine Islands, the Panama Canal, and Puerto Rico. Normally these commands control both military and civilian army work within their areas. They conduct military operations, and manage procurement and production of supplies. They may also provide civil government for conquered and occupied regions. In time of war expeditionary forces are maintained as required.

Peacetime Services

Although the Army's first duty is to provide military

security, it performs many peacetime services. Its engineers helped to build some of the early railroads, such as the Baltimore & Ohio, the Erie, and the New York, New Haven & Hartford. They helped with the Erie Canal and the Chesapeake and Ohio Canal, and they surveyed the Great Lakes. They helped also with the first transcontinental railroads. In later days they dug the Panama Canal, and built the Bonneville and Fort Peck dams. Among the structures they erected in Washington are the Washington Monument, the wings and dome of the Capitol, and the Library of Congress. The Board of Engineers for Rivers and Harbors controls all navigable waters, including some 200 harbors, nearly 300 rivers, and about 50 canals. It also builds and controls works to check floods.

The Medical Corps has contributed vastly to the nation's health. Through such men as Walter Reed and William Crawford Gorgas, it conquered yellow fever. It has led in the fight against typhus, typhoid, and cholera. The chlorination of water to prevent disease is another Army achievement. The Signal Corps founded the weather forecasting service, and contributed to radio by helping to develop the vacuum tube, the loop aerial, and the radio beacon. The Chemical Warfare Service has developed crop dusting for farms and orchards, fumigation, and gas masks for industrial plants and mines.

The War Department and Military Cemeteries

Until 1933, when the National Park Service took over the duty, the War Department maintained the military parks and cemeteries. Since 1864 the United

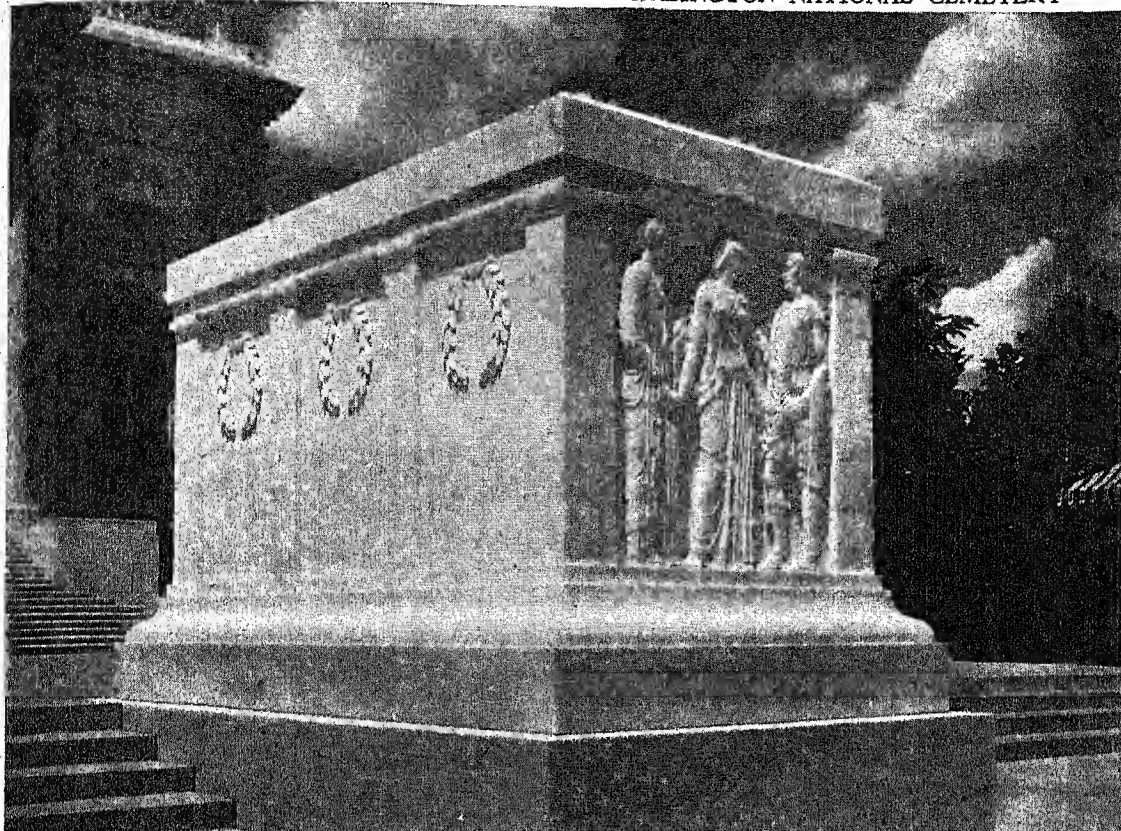
THE AMERICAN'S CREED

I BELIEVE in the United States of America as a Government of the people, by the people, for the people; whose just powers are derived from the consent of the governed; a democracy in a republic; a sovereign Nation of many sovereign States; a perfect union, one and inseparable; established upon those principles of freedom, equality, justice and humanity for which American patriots sacrificed their lives and fortunes.

I therefore believe it is my duty to my country to love it; to support its Constitution; to obey its laws; to respect its flag, and to defend it against all enemies.

—Written by William Tyler Page, Clerk of the House of Representatives, in 1917. Accepted by the House of Representatives, on behalf of the American People, April 3, 1918.

THE TOMB OF THE UNKNOWN SOLDIER AT ARLINGTON NATIONAL CEMETERY



"Here rests in honored glory an American soldier known but to God," is the inscription on the Tomb of the Unknown Soldier. The sculptured figures represent Peace, Victory, and Valor. Yearly on Armistice Day the President of the United States lays a wreath on the tomb, and distinguished visitors from abroad pay it the same honor. A soldier is on guard here night and day.

States government has been burying its honored soldier and sailor dead in Arlington National Cemetery, across the Potomac from Washington. A Union and a Confederate soldier were placed side by side at the first burial—the Blue beside the Gray. Among the heroes buried there are Gen. Phil Sheridan, Admiral George Dewey, Rear Admiral Robert E. Peary, and Maj. Pierre Charles L'Enfant, who drew the plans for the city of Washington. William Howard Taft was the first president buried there. Army and navy nurses, and wives of officers and men may be buried in Arlington.

Nearly 40,000 men lie beneath the soil of the gently sloping hills of this impressive Field of the Dead. Simple marble stones lined up like soldiers in battle array mark the graves of Civil War heroes. Here and there among the trees imposing monuments stand above the graves of famed warriors, but the size of monuments is now restricted. A beautiful marble amphitheater in which services are held stands as a shrine to all Arlington's dead. The Lee mansion on a near-by hill is of historic interest, for it was built by George Washington's stepson, John Parke Custis, and was the home of Robert E. Lee before the Civil War.

The Tomb of the Unknown Soldier is Arlington's

outstanding memorial. The Unknown Soldier was laid in the tomb on Armistice Day, 1921. Every precaution was taken to insure that the body was that of an American soldier killed in action, and that it should never be identified. On Sept. 9, 1921, the bodies of four unidentified Americans were taken from the military cemeteries at Meuse-Argonne, Saint-Mihiel, Somme, and Aisne-Marne. Gunshot wounds in the bodies told the story of these heroes' deaths. The bodies were placed in identical caskets at Châlons-sur-Marne, in France, in a temporary chapel in the City Hall. On October 24 a non-commissioned officer selected one of the bodies as the Unknown Soldier by laying a small spray of white roses upon the casket. This body was placed in a specially prepared casket and sent to America.

The eight permanent American cemeteries in Europe are in charge of the State Department, cooperating with a special board, the American Battle Monuments Commission. Six of these cemeteries are in France: the Meuse-Argonne, at Romagne-sous-Montfaucon (department of Meuse); Aisne-Marne, at Belleau (Aisne); Suresnes, at Suresnes (Seine), near Paris; Somme, at Bony (Aisne); Oise-Aisne, at Fère-en-Tardenois (Aisne); and the Saint-Mihiel Cemetery, at

Thiaucourt (Meurthe-et-Moselle). Flanders Field American Cemetery is at Waereghem in Belgium. The eighth cemetery is at Brookwood, near London.

V. THE DEPARTMENT OF THE NAVY

The Navy Department is administered by the secretary of the navy. The chief of naval operations has charge of the operations of the fleet and of preparing plans for its use in war. Among the divisions of his office are those of Intelligence, War Plans, Communication, Fleet Maintenance, and Training. He also directs the operations of the Marine Corps. The Hydrographic Office, in this office, makes surveys in foreign waters and on the high seas, publishes navigational maps and charts and coastal aviation charts, and conducts research in oceanography.

The Bureau of Naval Personnel has charge of personnel, including the Naval Academy at Annapolis and the Naval War College. Other bureaus are those of aeronautics, ordnance, ships (which designs, builds, and repairs naval vessels and their machinery), and yards and docks. The surgeon general heads the Bureau of Medicine and Surgery, and the judge advocate general is the authority on naval law. The Naval Reserve trains men for sea fighting, just as the army trains men in its Reserve Officers' Training Corps and its citizens' military camps.

The navy, like the army, has many peacetime duties. Naval officers administer the affairs of Samoa and Guam, fostering education, sanitation, and economic improvements. Thousands of merchant ships get their bearings from naval radio stations. Time signals are transmitted from the Naval Observatory at Washington, through stations at Arlington, Annapolis, Mare Island, Honolulu, and Balboa; the noon signals are also sent by telegraph (*see* Watches and Clocks). Research by navy officials helped develop ventilating systems for theaters and mines. Joint boards of the navy and army have contributed greatly to the development of commercial aviation.

VI. THE POSTOFFICE DEPARTMENT

The Postoffice Department conducts a gigantic business enterprise. Each year it delivers billions of letters and packages and issues money orders covering millions of dollars. It also operates a savings bank with thousands of branches. The postmaster general is the chief executive of this department, with four assistant postmasters general to aid him. The department has its own legal staff and its own force of traveling representatives, or inspectors. The legal staff has charge of enforcing laws against lottery schemes and swindlers. It can also exclude objectionable publications from the mails. (*See* Postoffice.)

VII. THE DEPARTMENT OF COMMERCE

Gouverneur Morris proposed a secretary of commerce and finance as early as 1787, at the Constitutional Convention. His proposal was not adopted until 1903, when the Department of Commerce and Labor was established to bring together the many commercial activities divided among other departments. In 1913 it was separated into two departments.

In promoting trade the Department of Commerce engages in the most diversified activities, many of which at first glance do not appear to be commercial. Its duties extend from the supervision of a skilled constructor of precision instruments to the provision of aids to navigation; from the charting of coasts and ocean bottoms to the coordination of the work of scores of statisticians and economists; from the compilation of a census of agriculture to the protection of a few hundred sealers in Alaska. Manufacturer, merchant, and consumer alike are helped by its work.

Oldest of the bureaus in the Department of Commerce is the Patent Office, which granted its first patent in 1790. This office also registers trade-marks. (*See* Copyright and Trade-Marks; Patents.)

Once every ten years the Bureau of the Census, another branch of the Department of Commerce, counts every man, woman, and child in the United States and in its possessions, and gathers such facts about them as their nationality, occupation, education, age, and sex. It also gathers statistics on agriculture, manufactures, business, mines and quarries, and other subjects. (*See* Census.)

The National Bureau of Standards

In 1921 the Department of Commerce made a survey showing that wasted labor and materials accounted for 49 per cent of the production costs in American industry. A Division of Simplified Practice was established within the Bureau of Standards to find ways of stopping this waste. Its achievements made an amazing story. It found that 78 types of beds, springs, and mattresses were being made. The number was reduced to four. There were 33 sizes of hospital beds. There were 44 different heights to those various beds. Now there is one standard length, width, and height. This standardization means a tremendous saving in the industry, and to the ultimate buyers.

Stationery does not seem an important item to a great industry, yet the bureau showed one railroad it needed only 679 forms, instead of the 3,789 it was using. The change saved that railroad \$55,000 a year. A maker of shipping tags found he needed only 17 sizes and styles, instead of the 85 he had been making. Hotels were taught how to simplify types and sizes of china, so that now only some 200 varieties are made as against 700 previously, and hotels were shown that instead of 190 varieties of silverware, they needed only 61. One result of this was a reduction of pottery prices by 15 per cent. Skid platforms and lift trucks were standardized by this government bureau, saving 50 per cent of this part of transportation costs. Every important industry coöperates in this simplified-practice campaign, from which the yearly savings run into millions.

The simplification of manufacturing practice, however, is merely one part of the work of the Bureau of Standards. There are 12 scientific and technical divisions to establish the standards used by all American industries. The bureau's task is to see that a ton, a yard, a bushel, a gallon, etc., mean the same to every

person everywhere throughout the country. Standards of length, mass, electricity, temperature, radioactivity, gravitation; relation between heat and mechanical energy; wave-lengths of light; tensile strength of materials, their resistance to pressure, their fineness;

The Bureau of Foreign and Domestic Commerce might be called a sales agency for American industries. Its staff of experts seeks new markets throughout the world. A manufacturer may obtain information from this bureau on the economic conditions of a country;

on the chances for the sale of his product there; the competition to be met; the prospects of prompt payment; and other details. The bureau's commercial attachés are under the jurisdiction of the Foreign Service of the Department of State. Officers are appointed by the secretary of commerce to the Foreign Service administrative and personnel boards to represent the department's interests.

The Coast and Geodetic Survey of the Department of Commerce makes hydrographic and topographic surveys of the United States and its coastal waters. It also makes tide and current surveys and magnetic surveys. It constructs nautical charts for the guidance of mariners, and aeronautical charts for air pilots. The facts gathered by the Survey are important in engineering and industrial operations, such as drainage and irrigation projects, flood control, building construction in earthquake areas, highway location, and settlement of boundaries.

The Bureau of Marine Inspection and Navigation su-

pervised the construction and equipment of all merchant vessels. It registered ships, enforced load line and other regulations, and investigated marine casualties. Its duties were transferred in 1942 to the Customs Bureau and the Coast Guard.

The Textile Foundation, Inc., conducts scientific and economic research for the benefit of the textile industry, including the production of raw materials.

The Inland Waterways Corporation runs the government-owned barge lines and works to coordinate rail and water transportation in the United States.

The Civil Aeronautics Board regulates commercial aviation (*see* Airplane).

The Weather Bureau, which had been in the Department of Agriculture since its organization in 1890, was moved to the Department of Commerce in 1940. It forecasts weather over land and sea. It warns of storms, frosts, floods, and forest fires. It studies

THE FILES OF THE PATENT OFFICE



The first patent was issued on July 31, 1790, and in the next hundred years the Patent Office granted about 430,000 patents. In the next 30 years it issued more than twice that number. Today the rate is about 44,000 each year. Patent No. 2,000,000 was issued on April 30, 1935. Actually it was No. 2,009,957, as 9,957 patents had been issued before the present system of numbering was adopted in 1836. There are 65 divisions under which patents are filed. The files shown here were transferred in 1932 to the new Department of Commerce Building.

performance of mechanical devices; codes of practise and safety for public utilities—these standards and others are established in the bureau laboratories.

In these laboratories we see chambers for testing automobile or aircraft motors at low temperatures and at pressures corresponding to altitudes up to 30,000 feet. We find experimental plants for making paper, textiles, rubber, cement, pottery, enameled metals, brick, and optical glass. The glass plant produces large quantities of the best quality of glass, much of which is used for military purposes. The bureau has the largest testing machine in the world, with a crushing capacity of 5,000 tons; this is used to test the strength of steel, building columns, brick walls, and concrete columns. In another building are three wind tunnels for testing the wind resistance of aircraft parts and the lift of aircraft wings by means of huge fans. One of these can produce a wind speed of 180 miles.

rainfall, temperature, winds, solar radiation, and upper air phenomena. It broadcasts information to ships at sea and to planes in the air, and it maintains a special weather service for farmers (see Weather Bureau).

Federal Lending Agencies

Several agencies which lend federal funds are in this department. Among them are the Disaster Loan, Defense Supplies, and Defense Plant corporations; the Rubber Reserve and the Metals Reserve companies. The Federal National Mortgage Association establishes a market for first mortgages covering properties on which are located newly constructed houses. The Electric Home and Farm Authority (EHFA) financed the purchase of domestic electrical and gas appliances and electrical wiring. It was abolished in 1942. The Reconstruction Finance Corporation (RFC) makes loans to banks and key industries. The RFC Mortgage Company makes loans secured by first mortgages on urban income-producing properties. The Export-Import Bank of Washington extends credit to American exporters and importers. Both the RFC and the Export-Import Bank were transferred in 1943 to the newly created Office of Economic Warfare.

VIII. THE DEPARTMENT OF AGRICULTURE

The activities of the Department of Agriculture cover a wide range (see Agriculture). The entire United States, with its possessions, and many foreign lands serve as the department's laboratory. It conducts technical and scientific research in the biology of plants and animals, the chemistry of soils, and the complex social and economic problems of the farmer. To acquaint the people with the vast amount of useful information gathered, it maintains a press service which distributes millions of copies of its publications annually. It also maintains offices of exhibits and of motion pictures, and a radio service.

The Agricultural Research Administration, created in 1942, comprises the Office of Experiment Stations, and the Bureaus of Animal Industry, of Dairy Industry, of Plant Industry, Soils and Agricultural Engineering, of Entomology and Plant Quarantine, of Agricultural and Industrial Chemistry, and of Human Nutrition and Home Economics.

The Office of Experiment Stations administers the federal funds for the support of agricultural experiment stations. It directs their research programs and coordinates them with the work of the department and of the agricultural colleges.

The Bureau of Animal Industry studies animal diseases and directs their treatment and control. It has raised the standards of breeding and has vastly improved cattle, sheep, hogs, and poultry. The Bureau of Dairy Industry studies everything relating to the improvement of dairy cattle and dairy products.

Plants, Pests, and Other Farm Problems

The Bureau of Plant Industry, Soils and Agricultural Engineering seeks new plants to add to the nation's agricultural products. It has naturalized durum wheat, Sudan grass, Pima cotton, dates, Peruvian al-

falfa, and avocados. It finds ways to improve the breeding and cultivation of plants, and studies plant diseases. Research in the fertility of soils is an important part of its work. It also studies farm production costs, the use of agricultural machinery, and farmhouse construction.

The Bureau of Entomology and Plant Quarantine studies insects which affect agriculture, forestry, industry, and human health. It develops new insecticides and cooperates with the states in pest eradication or control. Quarantine laws to prevent the introduction of pests are enforced by this bureau. The Bureau of Agricultural and Industrial Chemistry discovers and develops new scientific, technical, chemical, and industrial uses for farm products and by-products. The Bureau of Human Nutrition and Home Economics studies food and clothing problems, housing, and home equipment.

The Rural Electrification Administration helps to introduce electrical service into rural areas (see Electric Light and Power). The Extension Service cooperates with the state agricultural colleges in putting the findings of research into actual practice. County extension agents aid farmers in the application of new methods, and county home-demonstration agents keep rural women in touch with advancement in home economics.

The Bureau of Agricultural Economics is a general planning and economic research service. It coordinates the land-use, conservation, and marketing programs of the Department of Agriculture as a whole, and integrates the department's program with state and local planning.

The national forests are under the care of the Department of Agriculture through its Forest Service. This service promotes the efficient and economic use of both public and private forest lands and protects these forests against fires. (See Forests and Forest Protection.)

Financing Farmers and Planning for Future

The Department of Agriculture also helps the farmer with loans and insurance. The Farm Credit Administration, which supervises the various land and credit banks, is responsible to the secretary of agriculture (see Farm Credit). The Farm Security Administration makes loans to enable competent tenants, share croppers, and laborers to buy farms. It makes loans to destitute and low-income families, and advises them in farm management. The Commodity Credit Corporation makes loans to producers to finance the carrying and orderly marketing of agricultural commodities. Following the outbreak of the second World War, it financed the expanded production of food, feed, and fibers for war needs. It purchases farm products for export, and imports commodities from all over the world.

To check soil waste and educate farmers in soil and moisture conservation and scientific land-use principles is the work of the Soil Conservation Service. (See Land Use.)

HOW THE EXECUTIVE DEPARTMENTS ARE ORGANIZED



POSTOFFICE 1782

Postoffice Service
Railway Mail Service
Air Mail Service
International Postal Service
Money Orders—Stamps
Registered Mails
Postal Savings
Rural Mails
Parcel Post
Motor Vehicle Service



STATE 1789

Division of American Republics
Division of European Affairs
Division of Far Eastern Affairs
Division of Near Eastern Affairs
Office of Philippine Affairs
Caribbean Office
Foreign Service Administration
Division of Cultural Relations
Division of International Communications
Board of Economic Operations
Division of Commercial Affairs
Division of Current Information
Treaty Division
Division of International Conferences
Passport Division
Division of Protocol



AGRICULTURE 1862

Bureau of Agricultural Economics
Bureau of Agricultural and Industrial Chemistry
Bureau of Animal Industry
Bureau of Dairy Industry
Bureau of Plant Industry, Soils and Agricultural Engineering
Bureau of Entomology and Plant Quarantine
Forest Service
Bureau of Human Nutrition and Home Economics
Office of Experiment Stations
Extension Service
Agricultural Marketing Administration
Soil Conservation Service
Rural Electrification Administration

EXECUTIVE OFFICE OF THE PRESIDENT

White House Office
Bureau of the Budget
National Resources Planning Board
Liaison Office for Personnel Management
Office for Emergency Management



WAR 1789

General Staff
General Headquarters
Commander, Ground Forces
Commander, Air Forces
Commander, Army Service Forces
Chief of Engineers
Chief of Signal Corps
Adjutant General
Inspector General
Judge Advocate General
Provost Marshal General
Chief of Finance
Chief of Ordnance
Quartermaster General
Chief of Chemical Warfare Service
Surgeon General
Chief of Chaplains
Chief of Special Services Branch
Executive for Reserve and R. O. T. C. Affairs
National Guard Bureau



NAVY 1798

Bureau of Aeronautics
Bureau of Ships
Bureau of Medicine and Surgery
Bureau of Naval Personnel
Bureau of Ordnance
Bureau of Supplies and Accounts
Bureau of Yards and Docks
Marine Corps Headquarters
Office of Chief of Naval Operations
Office of Judge Advocate General



LABOR 1903

Bureau of Labor Statistics
Children's Bureau
Women's Bureau
U. S. Conciliation Service
Division of Labor Standards
Wage and Hour Division
Public Contracts Division



JUSTICE 1789

Attorney General
Solicitor General
Assistant Attorneys General
Bureau of Investigation
Bureau of Prisons
Bureau of War Risk Litigation
Immigration and Naturalization Service



TREASURY 1789

Comptroller of the Currency
Fiscal Service
Bureau of the Mint
Bureau of Internal Revenue
Bureau of Customs
Bureau of Engraving and Printing
United States Coast Guard
Bureau of Narcotics
Secret Service Division
Division of Tax Research



INTERIOR 1849

Bureau of Mines
Fish and Wildlife Service
Bureau of Reclamation
Grazing Service
Petroleum Conservation Division
Bituminous Coal Division
Division of Territories and Island Possessions
Office of Indian Affairs
General Land Office
Geological Survey
National Park Service
Board on Geographical Names



COMMERCE 1903

Bureau of the Census
Bureau of Foreign and Domestic Commerce
National Bureau of Standards
National Inventors Council
Coast and Geodetic Survey
Inland Waterways Corporation
Patent Office
Textile Foundation, Inc.
Weather Bureau
Civil Aeronautics Administration

This chart shows the chief functions and divisions of each of the ten executive departments through which the president of the United States administers the affairs of the nation, with the dates of their founding, and the divisions of the Executive Office of the President. The Department of Commerce and Labor was founded in 1903 and became two separate departments in 1913. The Department of Agriculture was founded in 1862 but was not headed by a member of the

Cabinet until 1889. A number of "New Deal" agencies are also included in various executive departments. They are listed and described in the article on President Franklin D. Roosevelt. In addition to these chief executive departments headed by Cabinet officers, a number of separate agencies have been created. Among them are the Federal Trade Commission, Tariff Commission, Interstate Commerce Commission, Civil Service Commission, and Federal Reserve Board.

The Agricultural Adjustment Agency (AAA) attempts to establish the "ever-normal granary" by minimizing fluctuations in supplies and prices. It works through market quotas, loans on stored crop reserves, and a conservation program with supplementary parity payments. The Federal Crop Insurance Corporation insures wheat and cotton growers against such hazards as drought, flood, insects, and damage from inability to obtain labor, machinery, and other essentials. The Sugar Agency establishes quotas for imported sugar and for sugar produced within the United States for shipment in interstate commerce.

Help in Marketing Farm Products

Marketing activities of the department are consolidated in the Agricultural Marketing Administration. It collects crop and live-stock production statistics and gathers current market information from terminal markets, shipping points, and producing sections. It conducts research in standardization, grading, preparation for market, handling, and other phases of marketing. It also administers such federal laws as the meat-inspection regulations at stockyards and the acts establishing cotton, wool, and grain standards. It removes surplus farm products from the market during times of economic depression and distributes them to state relief organizations. During the second World War it worked with other government agencies to allocate available food supplies among the armed forces, the civilian population, the allied nations, and the territories reconquered from the Axis.

To check false or misleading information that might affect prices, the Commodity Exchange Administration keeps daily records of transactions at commodity exchanges (see Boards of Trade). It regulates "future" trading in grain, rice, cotton, butter, eggs, and other commodities.

IX. THE DEPARTMENT OF LABOR

The secretary of labor is charged with the duty of "fostering, promoting, and developing the welfare of American wage earners, improving their working conditions, and advancing their opportunities for profitable employment." The Children's Bureau concerns itself with all matters relating to child welfare, especially infant mortality, orphanages, juvenile courts, diseases, and child labor. The Women's Bureau sets standards for the welfare of working women, seeking to increase their efficiency and to open new fields for employment.

The Bureau of Labor Statistics keeps detailed statistics regarding labor conditions. The United States Conciliation Service acts as mediator in disputes between employers and employees. Since 1913, this service has mediated thousands of trade disputes. It also studies the causes of labor troubles. The Wage and Hour Division enforces the provisions of the Fair Labor Standards Act of 1938. It is authorized to enjoin manufacturers who do not meet these standards from shipping goods in interstate or foreign commerce. The Division of Labor Standards recommends desirable standards in industrial practice. The Public

Contracts Division enforces certain standards in government supply contracts. (See also Labor.)

X. THE DEPARTMENT OF THE INTERIOR

In the days of America's westward-moving frontier, when unoccupied land, minerals, timber, and wild life were abundant, the Department of the Interior freely granted the resources of the nation to individuals to hasten its development. Today the department's functions are reversed, and it is the government's chief conservation agency. Coal, oil, minerals, public lands, water power, fish, wild birds and animals, the scenic wonders and recreational areas of the country—all are being protected by this department for the future benefit of the people.

The General Land Office, created in 1812, manages the public lands, and the minerals within them. (See Lands, Public.) The Grazing Service conserves the forage and water facilities on federal range lands in the Western states. The Land Utilization Office coordinates and plans land-use activities of the department and other agencies concerned with the conservation of the nation's natural resources. The Bureau of Reclamation builds and operates irrigation, flood control, navigation, and water-power works in the Western states (see Dam; Irrigation and Reclamation).

The Bituminous Coal Division and the Petroleum Conservation Division attempt to prevent the waste of coal, petroleum, and gas, and to regulate their production.

The Bureau of Mines strives to improve safety and health conditions in the mining industry. It also works to increase efficiency in the mining, preparation, and utilization of minerals, and to prevent waste.

Other Activities of the Department

The Fish and Wildlife Service was established in 1940 to consolidate the Bureau of Fisheries, formerly in the Department of Commerce, and the Bureau of Biological Survey, formerly in the Department of Agriculture. The new service carries on the duties of these old bureaus whose conservation activities were interrelated. It regulates commercial fishing in inland and coastal waters so that the supply may not be exhausted. It stocks lakes and rivers with fish from its own hatcheries and cares for the seal herds of the Pribilof Islands.

The study and protection of wild life is an important part of its work. It maintains many wild life refuges, and investigates the natural history, foods, diseases, and parasites of birds and other animals. It regulates migratory-bird hunting; maintains fur-animal experiment stations; propagates game birds; and conducts investigations for the improvement of the reindeer industry in Alaska.

The Office of Indian Affairs has charge of the education, money, property, schools, and general welfare of all the Indians in the United States and Alaska.

The Geological Survey of the Interior Department examines the geologic structure, the surface and underground waters, and the mineral resources of the coun-

try. It conducts topographic surveys and issues both geologic and topographic maps of the entire United States.

National parks and monuments are administered by the National Park Service (*see* National Parks and National Monuments). The Division of Territories and Island Possessions has jurisdiction over all United States possessions except Guam and Samoa, which are under the Navy Department.

XI. COMMISSIONS AND BOARDS

In addition to the ten executive departments, there are many boards, agencies, and commissions responsible only to the president or to Congress. The first of these independent bodies, the Civil Service Commission, was created in 1883 (*see* Civil Service). In 1887 the Interstate Commerce Commission was created (*see* Interstate Commerce Commission).

During Woodrow Wilson's administration several important boards were created. The Federal Reserve Board controls the Federal Reserve banks and fixes interest rates (*see* Federal Reserve System). The Federal Trade Commission is charged with stamping out unfair competition and deceptive practices in commerce (*see* Federal Trade Commission). The United States Tariff Commission studies tariffs and recommends rates to the president and to Congress (*see* Tariff). The Shipping Board was organized in 1916 as a war measure, to foster the development of an American merchant marine capable of serving as a naval auxiliary in time of war. Its functions were transferred in 1936 to the United States Maritime Commission. (*See* Ships.)

A Federal Power Commission, established in 1920, controls all water-power sites on navigable waters, and grants licenses to utility companies and other private interests for their use. It also regulates interstate flow of electric energy and natural gas.

All activities for the relief of war veterans and their dependents are concentrated in the Veterans' Administration. The Bureau of Pensions (*see* Pensions), the Veterans' Bureau, and the National Home for Disabled Volunteer Soldiers were consolidated in 1930 in the new administration. In addition to pensions, the government provides veterans with hospitalization, insurance, and rehabilitation for the crippled.

The General Accounting Office is under the comptroller general of the United States, who holds office for 15 years and may not be reappointed. It is his duty, independently of the executive departments and

SALARIES OF HIGH OFFICIALS OF THE UNITED STATES

President.....	\$75,000
Chief Justice, Supreme Court..	20,500
Associate Justices.....	20,000
Ambassadors.....	17,500
Vice-President.....	15,000
Members of the Cabinet.....	15,000
Speaker of the House.....	15,000
Judges of the Circuit Courts...	12,500
Senators.....	10,000
Representatives.....	10,000
Ministers.....	10,000 to 12,000
Judges of the District Courts.....	7,500 to 10,000

Note.—These are the *basic* salaries. Changes are sometimes made temporarily to meet special conditions.

other agencies of the government, to secure the uniform settlement and adjustment of all claims and accounts in which the United States is concerned.

XII. "NEW DEAL" AGENCIES

The grave problems presented by the business depression beginning in 1929 resulted in a mushroom growth of federal bureaus. Many of these so-called "alphabetical agencies" of Franklin D. Roosevelt's administration were grouped in 1939 under three new bodies—the Federal Security Agency, the Federal Works Agency, and the Federal Loan Agency. The last-named was abolished in 1942 and its functions transferred to the Department of Commerce. The National Housing Agency was created in 1942. These agencies approximate executive departments in power and scope of activity. (For further details, *see* table with the article Roosevelt, Franklin D.)

Federal Security Agency

The Federal Security Agency groups under one head bureaus which aim to promote social and economic security, educational opportunity, and national health. The Social Security Board (SSB) administers the federal old-age retirement funds. It approves state plans for old-age and unemployment aid; and it investigates the most effective ways of providing economic security through social insurance (*see* Social Insurance). The United States Employment Service, formerly in the Department of Labor, was transferred to the Social Security Board in 1939, and to the War Manpower Commission in 1942. It gathers information on employment conditions throughout the country, and is developing a national system of public employment offices. It makes millions of placements annually.

The Office of Education, formerly in the Department of the Interior, directs educational surveys; collects and disseminates information on education in the United States and foreign countries; administers the funds appropriated for land grant colleges; and co-operates with the states in the promotion of vocational education and vocational rehabilitation of disabled persons (*see* Vocational Education).

The Food and Drug Administration was transferred from the Department of Agriculture in 1940. It administers federal laws designed to protect the public against unwholesome or adulterated foods and drugs, and against inferior cosmetics and disinfectants. The Department of Agriculture retains supervision of insecticides and naval stores. (*See* Pure Food Laws.)

The public health activities of the government are directed by the Public Health Service, which was transferred to the Federal Security Agency from the Treasury Department (*see* Health Department). The National Youth Administration (NYA) and the Civilian Conservation Corps (CCC) aimed to extend the educational opportunities of young people, to foster leisure-time activities, and to find employment for them. The CCC was abolished in 1942, the NYA in 1943, when war eliminated their duties.

Federal Works Agency

The Federal Works Agency coordinates all public construction activities. Under it are the Public Works Administration (PWA) and the Public Buildings Administration. The Public Roads Administration is the old Bureau of Public Roads, transferred from the Department of Agriculture. It administers the federal-aid appropriations and conducts research in highway design and construction. A large part of its work is done cooperatively with the state highway departments.

National Housing Agency

The National Housing Agency (NHA) consolidates the various housing activities of the government. The Federal Housing Administration insures mortgages placed by banks and lending institutions on homes. The Federal Public Housing Authority engages in slum clearance and low-rent housing projects, and in defense public housing.

The Federal Home Loan Bank Board, also in the NHA, charters and regulates Federal Home Loan banks. It operates the Federal Savings and Loan Insurance Corporation, which guarantees the safety of savings up to \$5,000 for each investor in banks and home-financing institutions. It also operates the Home Owners' Loan Corporation (HOLC), which grants mortgage loans to save homes from foreclosure.

Other Federal Agencies

The Securities and Exchange Commission (SEC) licenses and regulates stock exchanges and controls public utility holding companies (*see* Stocks and Bonds). The Federal Communications Commission regulates radio, telegraph, and telephone companies. The National Labor Relations Board protects the rights of employees to self-organization and collective bargaining.

The Executive Office of the President gives him "adequate machinery for the administrative management of the executive branch of the government." The White House Office helps the president to maintain commu-

nication with Congress, department heads, the press, the radio, and the public. The Bureau of the Budget, formerly connected with the Treasury Department, prepares and administers the annual budget which the president lays before Congress. It analyzes the financial requirements of all agencies in the Federal government and coordinates all federal statistical services.

XIII. NATIONAL DEFENSE AGENCIES

When war broke out in Europe in 1939, an Office for Emergency Management (OEM) was created. This later became the administrative center for various other defense agencies with broad powers. Chief among these is the War Production Board, whose duty is the general direction of the war procurement and production program. It orders the conversion, construction, and expansion of plants to war industry, and determines the procedures of all

federal agencies concerned with war production, including the Army and the Navy.

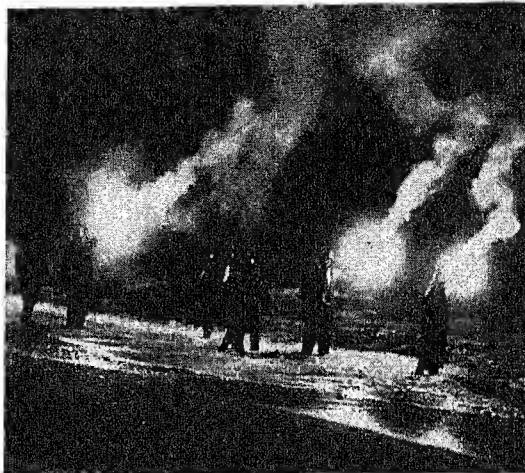
The Office of Price Administration prevents abnormal increases in prices and rents, profiteering, hoarding, and other practices which endanger the nation's economy. The Office of Civilian Defense (OCD) directs the volunteer activities of civilians. The War Shipping Administration assures the most effective utilization of merchant shipping. The National War Labor Board adjusts labor disputes which might interrupt war work. The Office of Lend-Lease Administration disposes of supplies for the use of any foreign government whose defense the president considers vital to the defense of the United States. The Office of War Information disseminates factual information to the public. (*See also* Nation at War.)

Territories and Possessions

The Federal government has authority over all territory which has not been erected into states. Under the Constitution Congress has power to make all needful regulations for the territories and other possessions of the United States. Even before the adoption of the Constitution, the Congress of the Confederation passed the famous Ordinance of 1787 for the government of national domain not a part of any state (*see* Northwest Territory).

Territorial governors and judges are appointed by the president, but the legislatures are elected by the voters. A territory also elects a delegate to Congress; he may take part in all proceedings but has no vote. The only territories now remaining are Alaska and Hawaii. Congressional legislation affecting an unincorporated territory, such as Puerto Rico, is not bound, as in the territories, by all provisions of the Constitution. The Federal government also administers the District of Columbia, as well as various insular possessions. (*See also* United States Government in Fact-Index, and Reference-Outline for Political Science.)

THE COAST GUARD IN ACTION



Part of the duty of the Coast Guard is to save life and property along the thousands of miles of coast line. Storm and bitter weather and black night never deter them.

Three CENTURIES of AMERICAN HISTORY



"Westward the course of empire takes its way," wrote Bishop Berkeley two centuries ago. Did he foresee the future of the American Colonies? 'Westward', this painting by Edwin H. Blashfield symbolizes the onward march of America.

UNITED STATES HISTORY. In this story of the American nation you may read the broad sweep of events which have made the United States one of the richest and most powerful nations of all times. Special sketches have been introduced to give a closer view of the lives and thoughts of the American people at important stages of the nation's progress. These stages, of course, are not marked off by equal periods of years, but by significant political, economic, and social changes. To understand them, you must begin with the colonial period, aptly called the European

Frontier in North America, because European conditions led to the founding of the small, isolated colonies on the Atlantic seaboard. Then the story continues with the founding of the American nation, and carries through the westward advance, the struggle for the maintenance of the nation, the great industrial development after the Civil War, and finally the narrowing world, in which distance has been annihilated by modern inventions and the United States is vitally affected by political and economic conditions in all parts of the world.

1—The European Frontier in North America

THERE have been two great factors at work in the making of the history of the United States. One has been the rich continent of North America, between the St. Lawrence and the Rio Grande; the other has been the civilization of Western Europe, carried across the Atlantic Ocean during three centuries of the greatest of the migrations known to history. None of the peoples important in the making of the United States had their start on this continent. Their civilization originated and developed elsewhere. For many centuries they and their ancestors lived in European societies whose laws and customs were crystallized and rigid, the result of long periods of growth. What makes the history of the United States interesting, and important, is the fact that when these peoples came to America they were set free from many of the restraints of the past, and out of the old habits of their lives were able to choose the good and reject

the bad. They constructed in the United States a civilization less the result of old habit and more the consequence of free choice than existed elsewhere. And for three hundred years this choice was contin-

uously going on upon a frontier in North America, which was in reality a frontier of Europe, at the place where civilization met the virgin wilderness.

European civilization in the Middle Ages was rigid; but the Crusades and their aftermath of foreign trade, the Renaissance, with its quickening of the imagination, and the Reformation, with its spiritual and political restlessness, led to discoveries that enlarged the Old World and brought our New World within reach. Columbus and his successors found what they

had not sought, and Spain and France tried to take quick profits out of the lands that blocked the way to the Indies. The Atlantic coast of North America offered few sources of sudden wealth; for a century its

ARRIVAL OF THE PURITAN SHIPS



Governor John Winthrop's ship, the *Arabella*, and her companion vessels of the Massachusetts Bay Company, lying in Boston harbor in 1630, were the forerunners of the forest of masts that came to stud this harbor as colonial commerce grew.

bays and rivers were left nearly untouched. Here the American colonies of England dug into their new homes after 1607, overrunning the little colonies of Dutch and Swedes. In the course of 150 years, Virginia (1607), Massachusetts (1620), Maryland (1634), Connecticut (1635), Rhode Island (1636), North and South Carolina (1663), New Hampshire (1680), Pennsylvania (1682),

had grown into villages and towns linked by roads in one almost continuous settlement from Maine to Georgia. The frontier line had been pushed back to the Allegheny Mountains, and in three generations the population had increased sevenfold. Despite English laws against colonial manufactures, defiant American craftsmen were working in iron, and nearly

THE FOUNDATION STONE OF AMERICAN DEMOCRACY



At least once a year the men of every New England community had their "town meeting." They voted taxes for the next year, elected officers, including the town clerk, the selectmen, the assessors, the school trustees, and the constables, and passed any local laws which seemed needed. The town meeting was the only truly democratic institution in the American political system.

and Georgia (1732), were settled under English control; while New York and New Jersey (1664) and Delaware (1666) were acquired. For almost half the period, England was at war with France to protect the settlements and the frontiers that each year worked their way up the river valleys to the west. The wars were over soon after the capture of Quebec and the evacuation of Fort Duquesne (Pittsburgh); and in 1763 France surrendered the country to the English (*see* French and Indian War).

In the same year, the English government decided to hold the colonies to the Atlantic seaboard, and by proclamation forbade the further development of western lands. This restriction, and other causes of friction between the colonies and England, started the movement that in a dozen years produced the American Revolution. But already the people of these colonies were ceasing to be English, or Scottish, or Irish, or German; some of them were already calling themselves American; they had built a life peculiarly their own, and they were unconsciously preparing to take the step that was to produce a new nation.

Colonial Life on the Eve of the Revolution

IN THE YEAR 1775 Edmund Burke, friend of America, rose to tell the English Parliament, "The colonies in general owe little or nothing to any care of ours . . . but through a wise and salutary neglect, a generous Nature has been suffered to take her own way to perfection." (*See* Burke, Edmund.) More clearly than anyone else Burke saw emerging from rough backwoods America a new culture and a new nation. Scattered outposts in the wilderness

every New England hamlet boasted a mill for dressing wool. But agriculture, whether on southern tobacco plantations or on small northern farms, was still the vital industry and nine out of ten men were farmers. So through the century the question was again and again debated by students at Harvard College, "Is agriculture a greater benefit to the state than commerce?" And farming usually won. Even at the end of the 18th century the New England colleges seem still to have arranged their calendars so that the students might help take care of the crops; Harvard and Dartmouth had their commencements on the last Wednesday in August, Bowdoin on the first Wednesday in September, and Yale on the second Wednesday in September.

But along the northern seaboard shipping and the expanding trade in fish and rum brought wealth to Boston, New York, and Philadelphia. England's navigation laws prohibiting colonial commerce with foreign lands made smuggling a lucrative business. The risks of this enterprise, too heavy for individual ship-owners to bear, led to the forming of syndicates which could afford occasional losses because of the great profits involved. Big business became an element of the northern colonial life. Perhaps the first American trust was the "United Company of Spermaceti Candles" which in 1762 controlled 17 factories in Newport, R. I.

With new growth, everywhere came opportunities for young men whose success in business undermined the class system inherited from England. Puritan congregations were no longer carefully seated by rank, and Harvard and Yale shortly before the

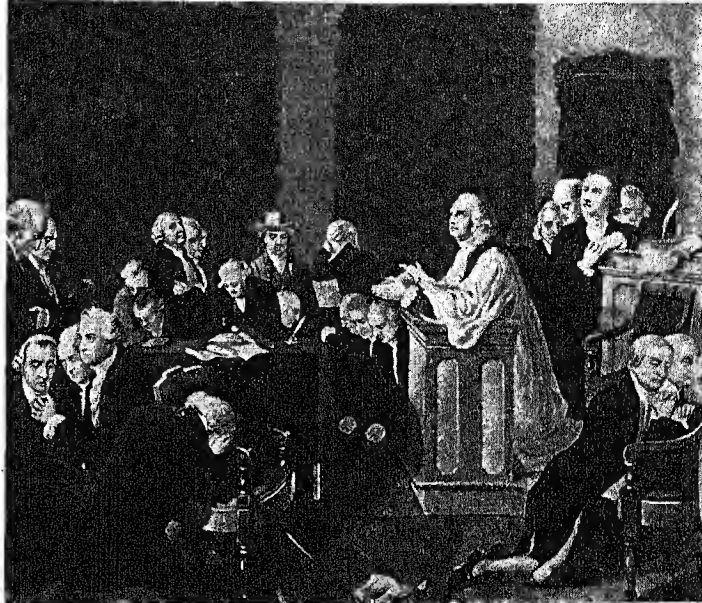
Revolution ceased classifying students according to social condition. Even in the aristocratic South small farmers acquired land and slaves and rose to the planter class. And Thomas Jefferson, a back-country boy, married into one of the "first families" of Virginia. A cultured New Yorker in 1765 noted that "the most opulent families, in our own memory, have arisen from the lowest rank of people." Though class lines might be crossed, they still remained clearly drawn. The North like the South had its upper and lower orders. So John Adams could say in 1775 "... in some countries the laboring poor are called freemen, in others they are called slaves; but the difference as to the state is imaginary only."

Especially in the North the familiar ways were changing. The despairing gloom of the Puritan faith, accentuated by wilderness life and the terrors of Indian wars, dispersed before the prosperous and varied enterprises of the towns. Many of the old rules of conduct remained. Fines were still imposed for absence from worship, for profanity in public, and for laughing in church. Some boys and girls of Norwich, Conn., were haled into court because they did on "Lord's Day evening, meet and convene together, and walk in the street in company, upon no religious occasion." But practises were changing. Men and women began to sit together in church. Membership dwindled in the Puritan sects, for wealth and luxury made men impatient with the old self-denying religion. Thus, in 1775 one-third of the rich Boston merchants were outside the fold of the Congregational church. The pastor had ceased to be the community leader and the Rev. Jonathan Mayhew, whose predecessors in the clergy had ruled New England, felt obliged to begin a sermon on politics with an apology for meddling in public affairs. In the preacher's stead emerged the lawyer, so important in the new times of commercial lawsuits and legal quarrels with England. From that day to this the lawyer has managed government and civic matters in the United States.

The new spirit was especially revealed in dress and social diversions. The working class still wore its rough homespun and leather, but the somber garb of Puritan ladies and gentlemen yielded to bright-hued velvets, flowered silks, and gold lace. Fricories such as gold lockets, parasols or "umbrilloes," and powdered wigs came in style. Indeed so completely were the new ways accepted that in 1752 an old-fashioned church member of Newbury, Mass., refusing communion because of the parson's "wigg," was disciplined for lacking "that humility which becomes a Christian." Dancing invaded Boston where a "Drum

or Rout" was prolonged until two o'clock Sunday morning! In the southern colonies, where the planters had copied the customs of the English gentry, courtly dress and entertainments had ever been the vogue. So the differences between Puritan North and Cavalier South diminished with the rise of a fashionable world. Yet one difference remained. The theater patronized by the amiable Southerner was still sternly

FIRST PRAYER IN CONGRESS



The Reverend Mr. Duché is offering prayer for the guidance of the First Continental Congress, at its meeting, Sept. 7, 1774, at Carpenters' Hall, Philadelphia, in this old engraving by H. S. Sadd. After dissension had arisen over the motion for an opening prayer because of the different creeds represented, Puritan Samuel Adams suggested that an Episcopal clergyman be invited first. Each house of Congress today has its own chaplain.

suppressed in New England. Lessening Puritan influence was bolstered by old statutes and ordinances.

Indeed, the fine arts did not flourish in the primitive colonial society. But a noteworthy sign of democratic growth was the spread of education and reading. By 1764 there were 5 colonial colleges and 17 public libraries. Among the foremost in urging the spread of education was the versatile Benjamin Franklin, who founded in 1731 the first circulating library and was instrumental in establishing the first college that gave training for ordinary living. His *Poor Richard's Almanac* was read by thousands every year. In 1760 a traveler who had seen New England, the cosmopolitan middle colonies, and the plantation South wrote, "Fire and water are not more heterogeneous than the different colonies in North America." Yet steadily and surely the widely circulating newspapers, the improved roads, and the postal service, which in 1753 the active Franklin reorganized, were creating a common colonial spirit. And in 1776 'Common Sense', Thomas Paine's anti-British pamphlet, reached 100,000 patriots who read its fiery message (see Paine, Thomas).

2—The Founding of A Nation, 1763–1825

FROM the end of the French and Indian War until 1823, when President Monroe announced that America was closed to further colonization and that Europe must not again interfere with the development of an American republic, was a little more than half a century. In Europe these years witnessed the end of the old order, the terrors of the French Revolution, and the great wars in which Napoleon tried to gain the dominance of Europe. In North America these years saw a population of a million and a half grow to more than ten million, the 13 colonies grow to 24 states, and a government of a new federal type, based upon a written Constitution, develop into conscious maturity.

This period, in which an American nation was being founded, may be subdivided into the American Revolution itself (*see* Revolution, American); the critical period between 1781 and 1789 in which the future was so uncertain and the Articles of Confederation proved to be unworkable; the Federalist period, through the presidencies of Washington and John Adams; and the Republican period, under Jefferson, Madison, and Monroe. By the time the last of these presidents left office, the United States had learned to handle many of the responsibilities of independence, had fought with France in 1798 and with England in the War of 1812, and had made several experiments in the use of arbitration as a means of avoiding wars.

The United States came out of the Revolution with independence gained; but without a strong government, and without a desire for one. It was only independence that had been desired, not a complete change in the political order. The new governments of the states were framed in close imitation of the colonial governments that they replaced, and the common law of England became the foundation of the laws in most of the United States. When experience showed that the general government, under the Articles of Confederation, had too little power to be effective, efforts were made to amend the Articles. Before the Federal Convention of 1787 met in Philadelphia to frame the United States Constitution, the states were occasionally near to anarchy, with armed bodies of farmers and townsfolk, such as in Shays'

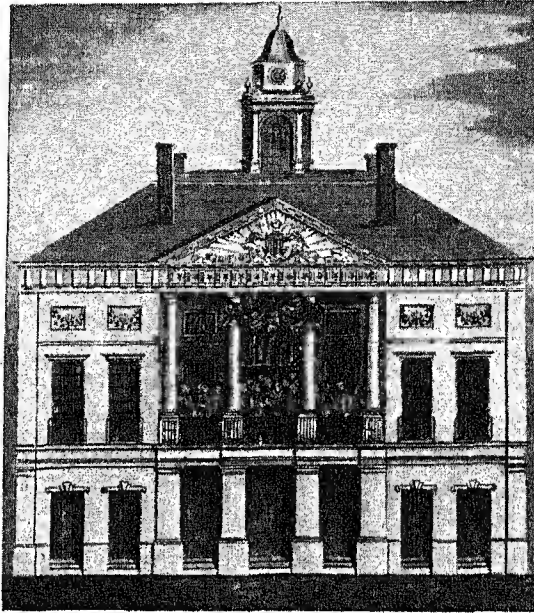
Rebellion, declaring their intention to fight rather than pay taxes (*see* Shays' Rebellion).

With the Constitution adopted, and Washington elected, there was still the problem of making the new government work. Hamilton, a constructive statesman, helped to frame fiscal laws which should

insure the government enough money to pay its bills. Washington enforced the tax laws when he put down the Whiskey Rebellion, and he kept the country out of the general European wars following the French Revolution (*see* Washington, George). Adams, however, found himself driven into the short naval war with France. With no such personal popularity as Washington possessed, Adams led a dying Federalist party against a rising Democratic-Republican party. When the latter took the side of France, the Federalists passed through Congress the Alien and Sedition Laws for the suppression of criticism by their opponents. They forgot that American freedom was founded on free speech and

the right to free discussion; and this unfortunate, and unsuccessful, vigor against Jeffersonians was followed by their overturn as a party. Thomas Jefferson became president of the United States in 1801, with support among the common people everywhere, and with most enthusiastic support in the newer regions where pioneer farmers were making homes for themselves in the wilderness. These pioneers were suspicious of wealth wherever they saw it, and wanted home rule, which they called "States' Rights." In the Virginia and Kentucky resolutions they avowed a principle of constitutional interpretation suitable to their desires. But Jefferson as president, and his successors of his own party, Madison and Monroe, found that the conduct of government had to be about the same, whether the president was Federalist or Republican. Like Washington, they had to meet the responsibilities of independence, and to protect the United States when the rest of the world was at war. Jefferson carried through the Louisiana Purchase and tried the Embargo Act, and then the Non-Intercourse acts, as preventives of war; he submitted to the *Chesapeake-Leopard* affair rather than go to war. But Madison found the forces for

THE FIRST FEDERAL CAPITOL



On the balcony of Federal Hall, in New York City, George Washington took the oath as first president of the United States, April 30, 1789. Here Congress held its first two sessions. From an engraving by Amos Doolittle, published 1790.

war more than he could control. New England was satisfied with peace and profits, but the new West, where the Republicans were strongest, demanded war with England, and forced it upon the country without making preparations to carry on the struggle. The War of 1812 ended without directly gaining its avowed ends; but the willingness of the United States to fight may have lessened provocations in the future.

And when the Napoleonic Wars ended soon after, the United States was let alone, to grow according to its own pattern. It grew so effectively that James Monroe felt able to declare the Monroe Doctrine, and the first period of American national development was over. (For further details of this period, see articles on each of the presidents; also Political Parties; United States Constitution; War of 1812.)

3—The Westward Advance, 1763–1850

WHILE the foundations of the United States government were being laid in the 50 years after the Declaration of Independence, the people of the United States were engaged in the work that is more distinctively American than anything else they have done. They were pushing the frontier to the west,

sale of this public domain; and, more important, agreed that new states, equal with old ones, should be formed as rapidly as occupied.

There were only 11 states under the Constitution at first, for Rhode Island and North Carolina were slow to ratify, and accepted the new government

GEORGE ROGERS CLARK SURPRISING KASKASKIA



The British redcoats and their gaily dressed ladies stare in astonishment at the frontier leader and his small band of troops who burst in upon their garrison dance, July 4, 1778. Taking this important fort on the Mississippi without loss of life, Clark continued his campaign until he had conquered the whole of the Old Northwest. This painting is by F. C. Yohn.

ever facing the irregular line of virgin country, from which Indians were reluctantly receding, and ever creating on the land they gained new farms and homes, new local governments, and at last new states. Pennsylvania developed an aggressive colony around Pittsburgh. Virginia paid off her soldiers in land, and let them settle in what was later Kentucky and West Virginia. Tennessee came into existence west of North Carolina, with a mixed population from all of the middle states. When the Revolution was over, the adoption of the Articles of Confederation was delayed until the states claiming to own the land beyond the mountains gave to the government, for the common use as public lands, all the land they had not already sold or given away. (See *Lands, Public*.) Congress in 1784, 1785, and 1787, in great western ordinances, provided for the government and

only after the inauguration of Washington. Soon after Rhode Island and North Carolina joined the Union, the westward movement began to bring additional states into existence: Vermont (1791), a frontier state in New England, Kentucky (1792) out of Virginia, and Tennessee (1796) out of North Carolina, enlarged the Union to 16 members; and a few years later came Ohio, the first of the states to have been built up entirely outside of the 13 original colonies.

There was a great flow of population to the west during the administrations of Washington; the flow slackened under Jefferson, for the East was prosperous, and there was work for everyone; it began again when commercial troubles appeared about 1805, and gained steadily thereafter for nearly 15 years. In 1812 Louisiana was admitted, and beginning in 1816,

one frontier state was added each year until 1821: Indiana (1816), Mississippi (1817), Illinois (1818), Alabama (1819), Maine (1820), and Missouri (1821). By the time Monroe left office there were 11 new states, and the ambitious western regions were already demanding a president from their own section. The power of the old party organization was too strong to be broken at once, and John Quincy Adams succeeded Monroe; but four years later Andrew Jackson, a military hero from Tennessee, was elected to succeed Adams, while another western idol, Henry Clay, built up an opposition to fight the Democrats, as Jackson's partisans were called.

**Life in the West
in the Age
of Jackson**

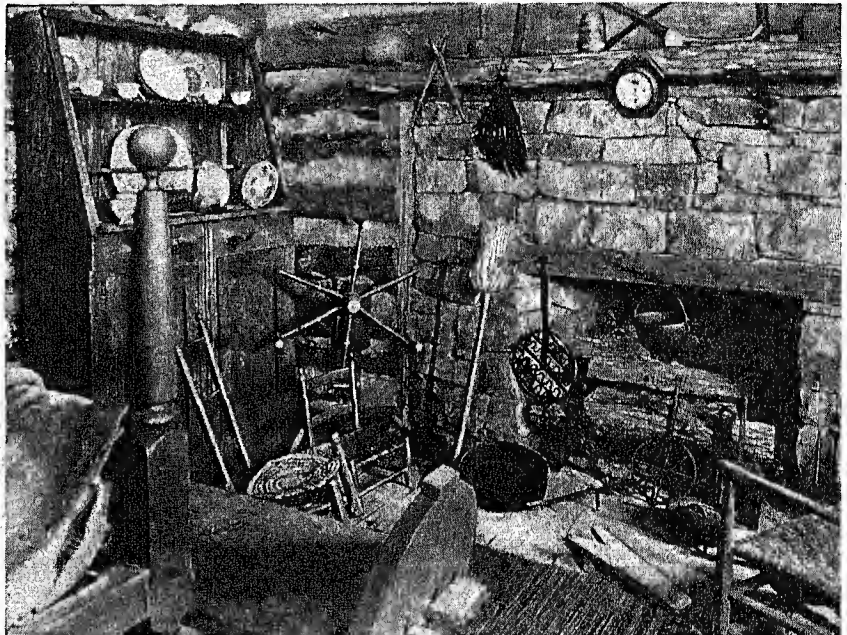
unnaturally the common man had his head turned by this sudden rise. Never had the White House beheld such scenes as occurred on the fourth of March, 1829. It was the day of President Jackson's inauguration. At the President's reception sturdy muddy-booted backwoodsmen celebrated victory, while the cultured leaders of eastern society expressed horror. Justice Story called the new age "the reign of King Mob."

Whence came this roistering throng? Out of the West, beyond the Alleghenies, from raw newborn towns, from straggling frontier settlements, from lonely cabins in the wilderness the old General's admirers followed their hero to Washington. Their homeland was a young and powerful empire. Its vast domain now extended from the Appalachian Mountains to the western edge of the Mississippi Valley and from the Great Lakes south to the Gulf of Mexico. Nearly 4,000,000 pioneers, one-third of the whole nation, inhabited its plains and forests and river banks. In addition, this frontier empire had its outposts in the East, in the Allegheny foothills, and in the remote fastnesses of northern New York and New England, where hardy settlers were just beginning to forge their way. Indeed, wherever a daring soul defied the forest, the redman, and the wild beast, he sensed his kinship with his frontier brethren, East and West. Small wonder, then, that

the customs and the ideals of these vast regions should eventually shape the whole American way of life and mold it in many unconsidered ways.

Lustily had the young West grown since 1800 when it had held but one-twentieth of the national population. First through the untamed forests came the roving hunter, alert and wiry, his long rifle always ready in his hands. Thus Daniel Boone blazed the trail to Kentucky, later to be "the dark and bloody ground." Close on the heels of the lonely ranger came the adventurer, seeking a fortune that could be easily won without steady toil. Usually he became a "squatter" on government land, building himself a rough log cabin and tarrying there for a few harvests grown amid the big trees. But the farther, unknown West ever beckoned and when settlement began around him his restless spirit urged him on. He gladly sold out to the land-hungry settler, who came with his cattle and household goods, seeking oppor-

MAKING A HOME ON THE FRONTIER



The western pioneer had neither time nor material to build fine houses, as we can see from this cabin at Fort Harrod, first settlement in Kentucky. Walls and fireplace are solid but crude. Few furnishings could be brought over the mountains in a pack train—the cherished dishes, the iron pots, skillets, and trivets, and perhaps the spinning wheel and the poster bed with its rope "springs." The cabinet and the fireside bench show the frontier carpenter's work. The boot-jack on the floor, as well as the broom and the turkey-wing duster, was the pioneer's work.

tunity in a new and fertile country. It was this last arrival who cleared away trees, plowed the soil, and built a stout cabin, plastering its chinks with clay. It was he who joined with his neighbor in the community enterprises of law, mutual aid, and sociability. And it was he who became the rugged typical citizen of the Jacksonian democracy.

Life on the frontier was above all democratic. Gentle breeding, even wealth, availed a man nothing when his very existence depended on the deft use of the ax, the rifle, and the plow. He who was sound

of limb and quick of eye was the equal of his fellows and he demanded his equal rights. Independence and initiative were essential virtues of the pioneer. He took the lead in administering self-government and

town" whose streets were "a chaos of mud, rubbish, and disorder." The first hustling realtor was speculating then in lands. Many were the dream cities planned on paper everywhere in the West. And

NEWLY CLEARED WESTERN LAND



How dreary this frontier homestead looks to us, with blackened stumps and muddy stock-run. But the pioneer farmer looked with pride on the land he had cleared with so much labor. He feared the forest where Indian foes might lurk. This etching was made in 1829.

a justice which, if not always legal, was adapted to the needs of the community. So when, in a trial for horse-stealing, the unanimous verdict of the jury was blocked by one of the twelve, himself the accomplice of the accused, the eleven other jurors convinced the dissenter by straightway preparing to hang him. The duel was almost as common as the lawsuit as a method of settling disputes. Jackson himself is said to have exhibited to visitors at the White House a pistol with which he had shot a man years before.

Such a people prized individual freedom, yet the constant need for group action and the democratic dread of appearing "different" forced all to hold the same opinions. Indeed, for the practical pioneer "common sense" was enough. He was suspicious of theorizing. There were a few like Abraham Lincoln who thirsted for "book-learning," yet more typical was Davy Crockett, who became a judge in Tennessee before he had opened a law book or could do much more than write his name. Thus art and literature did not thrive, though in 1830 Lexington, Ky., and Cincinnati each claimed the title of "the Athens of the West."

Frontier cities were growing, yet Chicago numbered only 4,000 people in 1835. Springing up in the first American real estate boom, it was a "mushroom

souls. The traveling preacher was everywhere welcomed, and the pent-up emotions of the frontier folk gushed forth with abandon at revivals and camp meetings, where worshipers rolled on the ground in

DANCING AFTER THE HUSKING BEE



This old print shows the joyous side of frontier life. Neighbors gathered from miles around to help the host with his autumn corn husking. When their day's task is finished, they all trip a rousing square dance to the tune of fiddle and horn. The cider barrel offers refreshment.

the throes of religious ecstasy. These people were capable of deep moral fervor and soon all their suppressed feelings burst forth in the slavery quarrel.

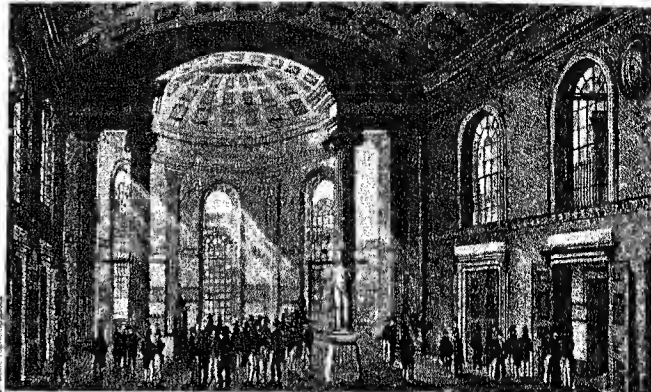
South of the Ohio the Southern planter had extended his sway, but north of the river New England dominated. As pioneers they felt alike, but as pioneers they felt intensely, and soon the slavery question made free men bitter foes. When Jackson died in 1845 planter and Puritan were rending the frontier.

Life in the East in the Age of Jackson

GEORGE WASHINGTON would scarcely have recognized the country he had fathered, if he had come back after a generation to see the enterprises and the customs of the nation over which Andrew Jackson presided. You need but glance at portraits of these two heroes to find visible proof of great changes. Eighteenth century knee-breeches, laces, and powdered pigtails had given way to long trousers, frock coats, and short hair. "Old Hickory," as General Jackson had been fondly called by his soldiers, stands before us in modern dress. Indeed, in many ways the times of Jackson were the beginnings of modern America. The fancy garb of silks and laces for men yielded to plainer apparel because the people of the United States had become a busy nation wherein almost every man worked at a trade, or business, or profession. This universal employment distinguishes the modern world from previous ages, and it was an

In the mountains of Pennsylvania canals were stretched up almost to the summits, and over the mountain tops the boats were hauled by donkey engines. Then came a great innovation. English and American inventors had for years been experimenting with roadways made up of two parallel rails. In 1827 certain forward-looking citizens of Baltimore, Md., founded the Baltimore & Ohio Railroad. Mule power, sails, horse-treadmills, and still other forms of propul-

NEW YORK CITY IN JACKSON'S TIME



These handsome buildings in the country's chief city of the 1830's reflect the prosperity resulting from commerce on the newly built canals and railways. Above we see the stately interior of the Merchants Exchange, before it was destroyed by fire in 1835. At left, smartly dressed folk promenade along the sidewalks bordering Bowling Green, and high-stepping horses clatter over the cobbled streets. Below, narrow old Wall Street runs quietly toward Trinity Church flanked by the Presbyterian Church and the Custom House on the right.



important phase of Jacksonian democracy. Especially in the northeastern states of Jackson's time do we see our modern nation emerging. Here most men still were farmers and tilled the soil in the manner of their forefathers. But changes were coming about in rural living. On the shelves of the village stores, alongside the simple tools and utensils and the packages of tea and salt, began to appear bolts of cotton cloth and ready-made shoes and all manner of gewgaws from the outside world, that had never before been known on the farm. Articles not fashioned in the kitchen or woodshed or in the village shop were arriving over the new roads from newly erected factories. The farmer at first was suspicious of these "new-fangled" devices, but the appeal of novelty and comfort triumphed, and soon he was vying with his neighbor in promoting the cause of highway building and in shipping his produce to distant markets. New York State built the Erie Canal in 1825 and thereafter throughout the land ditches were dug wherever a body of water could be tapped.



sion were tested until "Tom Thumb," the locomotive of Peter Cooper, showed that the Railroad Age was to be the age of steam. Soon "iron horses" were clanking through the countryside at the dizzy speed of 15 miles an hour, astonishing folk in isolated spots. By 1840 you could travel from Maine to North Carolina on short local railroads and you could go from Albany, N. Y., to Buffalo if you didn't mind changing cars six times and waiting interminably!

All this bustling to and fro meant that big changes had come to America. What were once almost disconnected, self-contained neighborhoods became dependent parts of one large community—the society of the northeastern states. Moreover, the free exchange of ideas and objects led people to specialize in producing things. Factories appeared that made a few articles in great numbers. Machinery had brought this about. Machines driven by water power, then by steam, wove cloth, cut metal, and performed in a day a hundred tasks that had previously taken months. Factories rose in villages and by rustic waterfalls, and around these hives of industry grew up thriving cities. By 1840 there were 20,000 citizens of Lowell, Mass., scurrying along streets that 20 years before had been country lanes and pastures. Of all the changes in life which this generation beheld, the growth of cities was the most spectacular and the farthest reaching. But the largest places were not factory towns. New York, Philadelphia, Baltimore, Boston all were chiefly trading ports, whose magnificence grew with the canals and railroads. To the marts of New York in 1825 the Erie Canal brought the wealth of the West, and 1,300 ocean-going ships carried these products from that strategic harbor. This busy commerce brought the farm folk to the city in such great numbers that Father Knickerbocker's town grew in five years from 160,000 to 200,000 persons. In 1825, 3,000 New York homes were built in such mad haste that they were tenanted before carpenters put in doors or windows.

A FAMOUS KEG



From this old keg, Governor De Witt Clinton poured water from Lake Erie into New York Bay, to celebrate the completion of the Erie Canal in 1825.

In these feverishly growing cities perplexing problems arose. People were not used to living in such close quarters. Houses were built from street to street in solid blocks without the modern blessings of sewage systems and public water supplies. Lower New York became so congested that the first traffic laws restricted horses to the speed of a trot and decreed that they walk around corners. There was as yet no city fire department, and each citizen was required by law to keep his own leather water bucket and to respond to all alarms. Private volunteer fire brigades became the first social clubs and showed their flashy uniforms in elegant parades. They were often as diligent in preventing their competitors from fighting fire as in extinguishing flames themselves.

But while municipal enterprise lagged, in business and social life organization was being rapidly perfected. By the 1830's the modern corporation had emerged and was applied to every purpose in business, religion, education, and charitable activity. In short, the genius of the age was concerted action and it revealed itself less formally in street riots against foreigners, in the first industrial strikes, and in reform movements. Temperance, prison reform, women's rights, free education were but some of the undertakings begun in this age. Irving, Cooper, Poe, Bryant, all were writing then; but these were not otherwise years of artistic distinction. Europeans thought the United States uncultivated, mercenary, and hustling. And so they were. There seemed no time for art or reflection when men were conquering the continent.

4—*Westward Advance Continues to the Pacific*

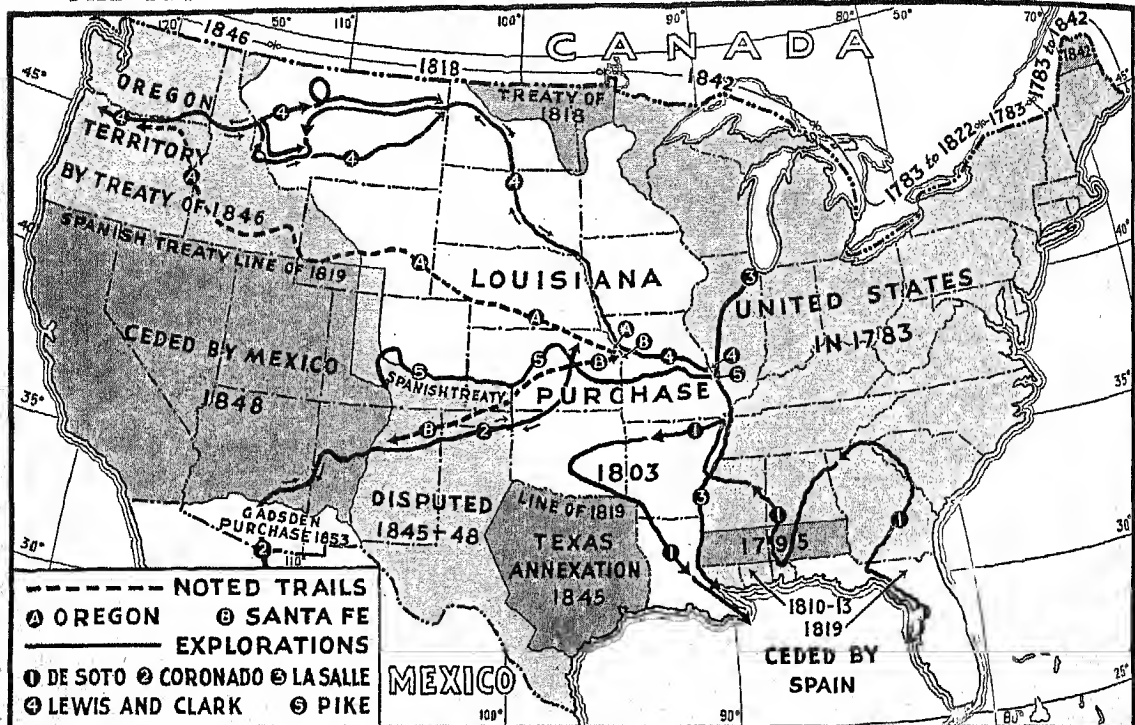
THE westward movement of the great migration was relaxed after 1820, for the West was depressed by hard times. It began again after ten years, and Arkansas (1836) and Michigan (1837) were added before the next panic, in 1837. It slumped during the panic for a few years, but revived with Florida (1845), Texas (1845), Iowa (1846), and Wisconsin (1848). And every new state changed a little the point of view of the government towards larger nationality.

While the westward advance progressed, the boundaries of the United States were being adjusted to accommodate it. The boundaries granted by England in 1783 were occupied with difficulty by Washington and Adams in the years that followed; but Jefferson's purchase of Louisiana opened new questions for adjustment with the old neighbors, England and Spain. With the former, the matter was not difficult; the 49th parallel from the Great Lakes to the Rocky Mountains was accepted; and this long unfortified boundary of 3,000 miles between the United States and Canada has become one of the

great monuments of peace. There was long discussion with Spain before, in 1819, the boundary in the southeast was settled by purchasing Florida.

In the southwest the settlement of the boundaries required another generation. After the hard times of the 20's migration was resumed, with steamboats carrying settlers up the Mississippi and Missouri rivers, and with the wagon roads carrying farmers across the boundary into Texas, then a part of Mexico. While Iowa and Wisconsin were being organized as territories, on the way to statehood, Texas was fighting for freedom from Mexico; and the three American frontier communities were admitted as states within a few months. Mexico resented the loss of Texas, and war, with both sides to blame, followed in 1846-48 (see Mexican War). As a result the United States boundaries were again changed, to include not only Texas, but part of New Mexico, most of Arizona, and all of California. In 1853 James Gadsden, then United States minister to Mexico, negotiated the purchase of a strip of land

THE TERRITORIAL EXPANSION OF THE NATION—A MAP STORY



This map shows how the United States grew to its present size. After the Revolution, various treaties with Great Britain fixed the Canadian border, and in 1795 Spain relinquished claim to a strip in the South. The Louisiana Purchase created vexing problems because it did not specify boundaries. It was taken to include the western land drained by the Missouri and Mississippi. The United States also claimed—and in 1810 and 1813 occupied—western Florida. In 1818 Great Britain agreed to the 49th parallel as the northern boundary, and thereby ceded part of the Red River Valley, outside the Mississippi and Missouri valleys. Spain ceded Florida in 1819 and also accepted the boundary shown between the lands it then held in the West and United States territory.

south of the Gila River, in southern Arizona and New Mexico, for which the United States paid Mexico \$10,000,000. This added strip, including 45,535 square miles, was of little value for agriculture, but it provided a route for the Southern Pacific Railroad, then already being projected, and it ended the boundary dispute with Mexico.

While the Mexican War was being fought, the boundary discussion with England was renewed, and in 1846 the 49th parallel as a boundary was extended to the Pacific, and Oregon became territory of the United States. The westward movement had come to be called "manifest destiny" by this time, and there were some who foresaw an occupation of the whole continent; but the present boundaries of the United States had been reached, and here the process stopped. Except for detached pieces of territory bought or conquered (Alaska, Hawaii, the Philippines, Porto Rico, the Virgin Islands, and a few others), the United States, as we know it, was complete. The pioneer experience, acquired during the westward advance, was continuing to form the character of Americans. The Americans were mostly native born, since between the close of the French and Indian War (1763) and the beginning of the Mexican War (1846) immigration was still comparatively slight. The new nation had been born, had established itself,

and had grown almost beyond belief. It now remained to be seen whether it could maintain its existence against the internal forces that were working for its disruption.

How the People Lived and Thought

NORTH, SOUTH, and Northwest were three great and distinct sections by 1860. All were growing rapidly; the Northwest fastest, as the pioneers settled the distant prairies. The South had grown wealthy on the cotton crop. But the North had grasped the reins of power. From Massachusetts and New Jersey to the shores of Lake Michigan flourished the factories of the dawning Industrial Age. The value of their wool, iron, and cotton manufactures was six times greater than 30 years before. The volume of shipping in northeastern ports had increased ten times, and two-thirds of the nation's banking was done in northeastern cities. The planter and the farmer paid toll to the hustling Yankee.

The sudden growth of northern business centers raised difficult social problems. The new Irish and German immigrants, herded in cramped quarters of New York and Boston, published newspapers, formed their own militia companies, and divided the cities into unfriendly national groups. Native sons grew frightened and organized protective societies. Amer-

icans and foreigners, Protestants and Catholics rioted in the streets. But the terrible depression of 1857 brought unemployment everywhere. In New York City idle laborers numbered 40,000, and crowds paraded the streets shouting "Bread or Death!"

DRIVING ON THE BEACH AT NEWPORT



This print from *Harper's Weekly* (1857) shows fashionable folk from the northern cities enjoying the sea air at this famous Rhode Island resort. In their smart carriages, driven by liveried servants, or on their spirited mounts, they passed up and down the beach, to see and to be seen.

There was a new aristocracy in the cities, and clerks and small business men strove to copy its ways. The men of fashion had made sudden fortunes in railroad and commercial enterprise. They did not ride with the common man in the recently invented horse-cars. They left their mansions to drive in smart carriages and outrage democratic sentiment with their display of liveried footmen. In the summer they fled the city heat to fashionable Saratoga and Newport. But on rich and poor the metropolitan life left its mark. *Harper's Magazine* in 1856 called the Americans "an apathetic-brained, a pale, pasty-faced, narrow-chested, spindle-shanked, dwarfed race." It was the next generation that developed athletic sports and overcame the effects of indoor life.

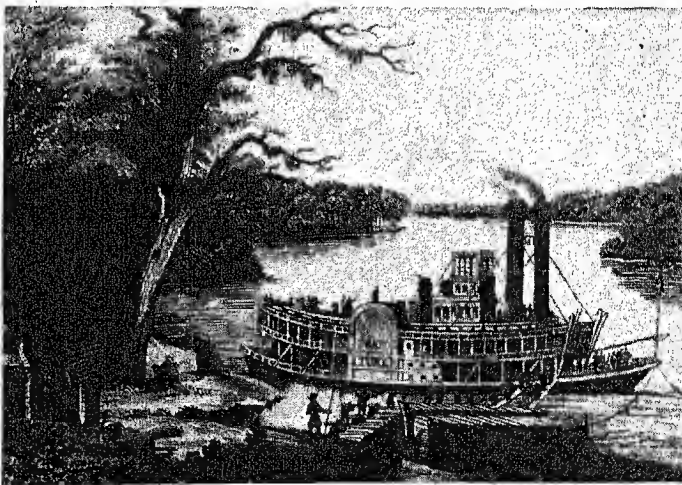
Organized entertainment gave scope for Yankee enterprise. The shrewd P. T. Barnum delighted New Yorkers with his museum of curios and hoaxes and presented to the public the dwarf, Tom Thumb, and Jenny Lind, "the Swedish nightingale," whose sweet voice captivated America. The German singing societies were raising the level of public taste. The nation was learning to like good music, although in 1854 the opening of the Academy of Music raised the question, "Are operas moral, and are prima donnas ladies?" Many people, clinging to Puritan traditions, still looked askance at the theater where Edwin Booth was giving his sublime interpretations of Shakespeare. New England

continued to dominate American literature. Holmes, Whittier, Lowell, Longfellow, Hawthorne, and, above all, Emerson expressed the finest of the Puritan ideals and combined the old with the new. The powerful voice of Walt Whitman, who sang of the common life, fell harshly on American ears.

Like a different nation was the pre-war South. Though chiefly agricultural, "Dixieland" had seen big changes. The planter had made cotton "king" and enthroned him in the young fertile lands of the Southwest. The old South of the Atlantic seaboard, with its tobacco-ridden, worn-out soil, could not compete with the vast plantations of the new cotton kingdom. Slaves could, however, be sold for the large field-gangs used farther west, and slavery became a new kind of institution. No longer was the slave like a strong docile child in the planter's family. Negroes were sold to masters in the cotton lands. They worked best in large groups, and the cost of oversight was no greater for fifty slaves than for five. Wealthy planters owned them by the hundred. The best-looking and the smartest slaves were chosen as house servants.

The picture of slave life given in 'Uncle Tom's Cabin' was harsh and overdrawn, but the North believed it. In fact, to his master the field-hand was valuable property. In colonial days an able-bodied slave sold as low as \$50, but he was worth as much as \$1,200 to \$1,500 in 1860. The planter sometimes found it cheaper to hire Irish laborers for unhealthy work like draining malarial swamps. Provided with shelter, coarse food, and clothing, the slave was physically better off than many a Northern mill-

FUELING A MISSISSIPPI STEAMER



This side-wheeled steamboat is tied to the bank while her deck-hands hustle with a load of wood for the ever-hungry firebox. Fueling stations dotted the banks of the Mississippi, for no steamer could carry enough wood to last more than a few hours. As late as the 1850's the fastest boats took four or five days for the up-river trip from New Orleans to Louisville.

hand. But at best the life was hard and Frederick Douglass, an ex-slave, wrote that "the dark night of slavery closed in upon me, and behold a man transformed to a brute."

In 1850 a few powerful planters—perhaps 2,000 wealthy families—ruled the cotton kingdom. The large plantations were not only more profitable because slave labor could be handled easily in large numbers but because the owner could allow a part of his land to lie fallow each year and thus lose less in fertility. The great planter made relatively large profits, and lived accordingly, like a feudal lord. He looked down on people in "trade," and spent his ample leisure in lavish entertainment, in hunting and horse-racing. Disputes were settled by the dueling

pistol on "the field of honor" in the South long after the practise was frowned out of existence in the North. Small wonder that the planter preferred the chivalrous heroes of Sir Walter Scott to Dickens' common folk. But the sporting Southerner had little taste for books in general, and little opportunity for culture in music and art except in a few centers.

In the absence of trade and industry few towns grew in the South. So there were few merchants or mechanics, and, since the plantation system left no place for the prosperous small farmer, no middle class. Three-fourths of the Southern whites were poor, owned few or no slaves, and lived miserably on small farms. The planters and the slaves alike looked down on the shiftless "poor white trash."

5—The Maintenance of the Nation, 1850–1877

THE great and varied area of the United States, as it was between 1850 and 1860, with differing conditions of climate, natural resources, industries, and social structure, was held together by a system of governments that had not yet been fully tested. Local affairs, ordinary life, and business were controlled by the states, each in its own way, so long as no principle of the Constitution was violated. General matters, enumerated in the Constitution, were entrusted to the Federal government; and the difficulties of communication had thus far made it easy for each state to live its own life, without interfering with its neighbors, and without wanting by general law to impress its own standards upon all the rest.

But there were dangerous differences of opinion respecting matters which must be settled by the Federal government on a uniform basis for the whole country, if they were to be settled at all. One of these matters was the tariff, a device whereby revenue was obtained and manufactures were "protected" by the taxation or even the exclusion of goods from other countries. The Middle and Northern states, where factories had made their appearance early in the century, believed that protection to their industries would make them prosperous; but the Southern and West-

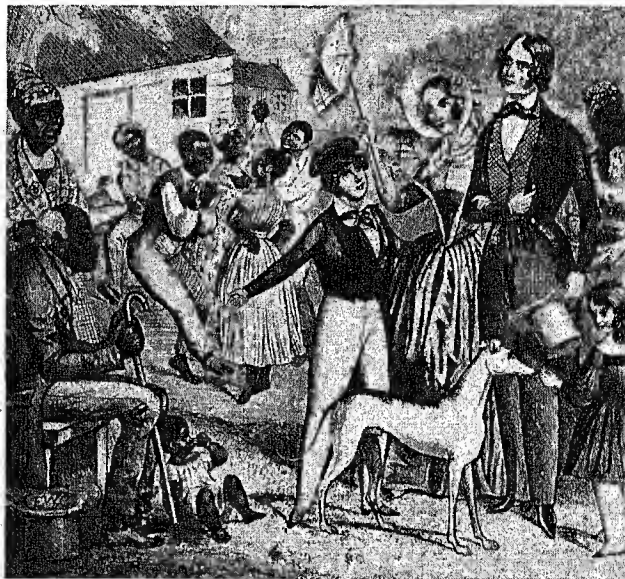
ern states, still mostly agricultural, and buying abroad many of their manufactured goods, were inclined to think that the tariff raised the prices of what they bought, for the selfish benefit of the manufac-

turing section of the country. Sectionalism had made the tariff a party issue; and in 1832 South Carolina had declared its right to nullify the tariff act of that year on the ground that it was unconstitutional. The matter was patched up, and the Union stood the strain (see Calhoun, John C.).

But the Southern states had another issue, even more dangerous to peace. This was slavery. Slavery had never been profitable in connection with the pioneer process of clearing the land and making new farms; nor had it paid well in the Northern climate where the farmer raised many different crops and faced a complicated task in caring for them.

But slaves from Africa had flourished in the warmer climate of the South, had worked well in the cultivation of tobacco, and had been found almost ideally suited to work in cotton fields. After the cotton gin invented by Eli Whitney had revolutionized the process of separating the lint from the seeds, cotton could be produced and woven into cheap cloth. Then there was a market for it among the common people of all the world, and the South had difficulty in raising

"IN DE LAND OB COTTON"



This idyllic picture of plantation slave quarters shows the answer of the Southern idealist to 'Uncle Tom's Cabin' and other anti-slavery works. It comes from a double cartoon by E. W. Clay, published in 1841, and widely broadcast. The other half (not reproduced here) pictures the starving family of an English industrial "slave," contrasting their miserable state with the carefree life of the loyal negroes, whose master looks after their comfort, provides and encourages amusement for them, and cares for them in sickness and age.

enough to meet the demand. There was use for all the slaves that could be imported or raised.

The Southern aristocracy was already making money out of its slaves at the time of the nullification controversy; and the North, where slavery did not pay, was looking askance at an institution which was repugnant to the humanitarian ideas of the time. In 1820 there was a sharp fight over slavery in Congress, as the Southern states demanded the right to take slaves to the Western territories, and the fight was settled only by the Missouri Compromise, by which Missouri was allowed to become a slave state, but slavery in the rest of the Louisiana Purchase, north of the south boundary of Missouri, was forbidden (see Missouri Compromise). When,

30 years later, additional Western territory taken from Mexico, or ceded by England, became available, the Northern states desired a general law forbidding the entry of slaves; the Southern states demanded free access to the whole region of the Far West, with their slave property. Henry Clay, who had been instrumental in arranging the Missouri Compromise, in his old age planned the Compromise of 1850 whereby California (1850) became a free state at its own desire, and the remaining territories of the new area were authorized to organize without mention of slavery.

The Southern fear of a general law, passed by Northern votes, excluding slavery from the territories and even restricting it within the states where it had always existed, was not silenced by the Compromise of 1850; but for nearly a generation the president had been either a Southerner, or a Democrat sympathetic to the South, and these fears were allayed. Jackson had been both Southerner and Democrat; his suc-

cessor Van Buren, a New Yorker, was a Democrat. Harrison, a Northern Whig, was soon followed by a Virginia Democrat, Tyler, a Tennessee Democrat, Polk, and a Louisiana Whig, Taylor. Fillmore was indeed Northern and a Whig, but Pierce, of Vermont, and Buchanan, of Pennsylvania, were Democrats.

Under Democratic influence the Missouri Compromise was repealed in 1854 in the Kansas-Nebraska Act (see Kansas-Nebraska Act), and the Supreme Court stated that the exclusion of slaves had never been constitutional (see Dred Scott Decision).

The new states, however, that sought and gained admission were invariably free: Minnesota (1858), Oregon (1859), and the territories that were ripest for further admission, Kansas

and Nebraska, were almost certain to be free. The rise of a Northern and Western party, the Republican party, pledged to the restriction of slavery in the territories, further aroused Southern fears; and when in 1860 its candidate, Abraham Lincoln, was elected president, the leaders of the South had little difficulty in leading 11 states into an attempt at withdrawal from the Union. Jefferson Davis became president of the Confederate States of America, the Civil War dragged on through four long years, and under the presidencies of Johnson and Grant, the successors of Lincoln, the South as conquered country knew the bitterness of defeat. Reconstruction left these sections still embittered. The struggle and the waste that accompanied it helped to bring on a sharp financial panic in 1873. And when the panic subsided, and Hayes succeeded Grant, the nation passed into a new period of its history. (See Civil War and Reconstruction; Confederate States of America; also each of the presidents named.)

DENOUNCING SLAVERY IN THE NORTH



This illustration from *Gleason's Pictorial* of May 3, 1851, shows Wendell Phillips haranguing against the Fugitive Slave Law at a meeting on Boston Common. The Abolitionists agitated against this act, and refused to obey it, invoking a "higher law than the Constitution." They formed "underground railways" to help escaping negroes to safety across the Canadian border.

6—Industrial America, 1877–1897

THE Civil War weakened the Democrats and left the Republicans in power for many years. Of the 16 elections beginning in 1868, in only 4 were Democratic presidents elected, and each of these owed his election to a break within the dominant party. The Republican party, born as a party of human rights, stayed in power during a vast industrial expansion, and came to be the party of business and wealth, and the protector of industry through its protective tariff. Prosperity came back with Hayes, and with little

slackening continued under Garfield, Arthur, Cleveland, and Harrison; but in the second administration of Cleveland in 1893, panic broke again.

Meantime the last steps in the occupation of the continent were taken; Kansas (1861) was admitted as the Civil War broke out; West Virginia (1863), Nevada (1864), and Nebraska (1867) were added during the war period; Colorado (1876) came in as the 36th state in the centennial year; the new railroads to the West carried settlers into the recesses of

the continent, and in 1889 came North Dakota, South Dakota, Montana, and Washington. Wyoming and Idaho followed in 1890. There were left for admission, to complete the roster of the states, only four more areas: Utah (1896), Oklahoma (1907), New Mexico (1912), and Arizona (1912). The population of the country, 31,443,321 in 1860, doubled to

to America. During the period 1763-1850 there was relatively little immigration; then came many thousands from Ireland and Germany (1845-65) as a result of political and economic disturbances in those countries. Then, with the revival of American prosperity about 1877, immigration increased, with Germans and Irish still leading, and with Norwegians

DRIVING THE SPIKE THAT UNITED EAST TO WEST



Here stands Leland Stanford, president of the Central Pacific Railway, ready to drive the gold spike fastening his track, built east from California, to that of the Union Pacific, built westward to meet it. These two lines, meeting near Ogden, Utah, on May 10, 1869, formed the first transcontinental railroad. The building of such roads, planned in 1862, was one of Lincoln's projects for uniting the North and preserving the Union. Settlement of the West leaped ahead with rail transportation.

62,947,714 in 1890. And when the first century under the Constitution ended in 1889, the United States had ceased to be chiefly a nation of farmers, and had responded to the influences of the Industrial Revolution. There were millionaires and paupers, palaces and slums, factory cities and backward farms, universities and settlement houses, a dominant social class, descended from the Americans of the Revolutionary period, and a working class recruited from new immigrants from western Europe. Capital and labor had been brought into contrast and opposition.

It is not strange that during these years of growth and change, there was confusion in American ideals. After the Civil War corruption in government, Federal, state and local, was rampant; and many attempts by reform, or by education, were made to combat it. In spite of seeming failure American confidence in education as the foundation of democracy never weakened. This was the period of the growth of great universities. High schools increased in number and in size. Prosperity was so general that each year more children could stay in school instead of going to work, and more of the graduates could go on to the colleges. (*See Education.*)

During these years, too, the prosperity of the United States brought many millions of immigrants

and Swedes included, until through the 80's the stream was flowing in huge volume. The later immigrants congregated in the cities, and created problems in the slums to be met by new reforms in city government, and by social relief and charity on a large scale. The immigrants became the workers in the new factories, and the attempts to improve their conditions led to strikes and to the "labor" movement (*see Immigration; Labor Organizations*). Before the period was over, many thoughtful people were raising the question as to what the American population would be when the immigrants had all been assimilated, and the children of various races and alien bloods had been transmuted into Americans.

The improvements in communication, increasing since the opening of the Erie Canal in 1825, had passed into the first period of railroad building (1837-57), and then the period of the continental railroads (1861-85). The telegraph, the telephone, and new processes in printing had speeded communication, and the whole country had become an industrial unit of vast dimensions. Business had used these tools, and successful business, whether by skill, or greed, or control of patent processes, or by strategic advantage had grown into the "trusts" (*see Trusts*). Before 1890 the magnitude of the trusts frightened the people, lest they

should overshadow government itself. The Interstate Commerce Act (1887) and the Sherman Anti-Trust Act (1890) were the beginnings of government effort to control big business. But the Republican party, generally in the majority, gained its support from the men of business, and was slow to see new dangers.

The tariff issue, which was the dominant issue between the parties from 1880 until 1893, was replaced by the demand from the West for government in the interest of the common people. The agricultural West demanded control of the trusts, and relief from the low prices of commodities through free silver and other changes in the money of the country. William J.

Bryan was nominated in 1896 by the Democrats and also by the Populists, who were the new party of the West; but the forces of the East (business, conservatism, and sound money) defeated Bryan, and William McKinley became president in 1897, succeeding Grover Cleveland. With McKinley, the identification of the Republicans with the North and East, and with the forces in control of business was complete; and a new period opened, to run for nearly 20 years, during which big business was continuously fought by reformers, while the American people came to believe that the nation must again fight to maintain itself, this time against the interests of selfish profit.

7—The Control of Industry, 1897–1915

McKINLEY, like Hayes, took office as business revived after a severe depression. The nation's prosperity became a great political asset to him and his successors, Roosevelt and Taft.

For 14 years, 1897–1911, there was unbroken Republican control of the national government, with president, Senate, and House of Representatives always of that party. The Democrats were split by internal dissension, those from the North being opposed to Bryan and free silver, while those from the South and West were in favor

of both. The leaders who were most effective in attacking the apparent control of the government by men of wealth were the younger Republicans, often from the West. And when about 1901, there came a period of reorganization and consolidation of big business, the Westerners began to demand that the tariff be reduced on trust-made products, and that the government break up monopoly and control the railroads and the banks. There was the beginning of the progressive movement. The older, Eastern Republicans, the "stalwarts," were generally opposed to it; but President Roosevelt gave it his support and fought for what he described as social justice, that every man, rich or poor, should have a square deal. A new government department, of commerce and labor, was set up in 1903, to control and help. There was increasing discussion of the conservation of natural resources, lest the timber, the coal, the water powers, the minerals, and the land itself should all fall into the hands of monopoly, and cease to serve the common people. When there came a minor panic in 1907, a demand

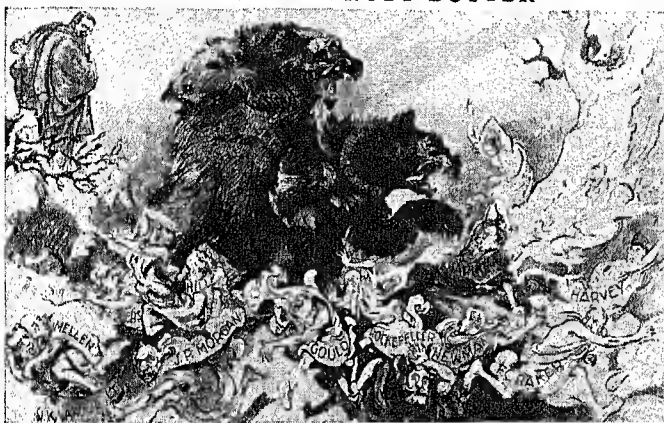
arose for a serious and non-partisan study of money and banking, in order that the United States might equip itself with a modern system of finance that

would be fair to all, and that would not play into the hands of the inner group of owners and managers of railroads, trusts, and banks that was coming to be called the "money trust." Congress passed laws to stiffen control of the railroads (1906) and to protect the purity of food and drugs (1906); and when Roosevelt went out of office in 1909, the most popular presi-

dent in many years, he left to his friend and successor, Taft, the task of bringing the progressive program to completion.

The contradictory points of view among the Republicans were too violent for Taft to overcome. The "stalwarts" and the progressive "Insurgents" fought to control policy; and the Democrats encouraged the dissension in the hope of profiting by a party split. Because of Insurgent opposition, the Republicans lost control of the House of Representatives in 1910, and the Insurgents organized their own party, the Progressive. In 1912 Taft managed to secure his renomination, but the Progressives persuaded Roosevelt to run against him, and the Democrats nominated Governor Woodrow Wilson, formerly president of Princeton University. Wilson was elected, with Democratic majorities in both houses of Congress. Then in 1913, Wilson and his followers undertook to pass the laws over which Republicans had wrangled ever since the first defeat of Bryan in 1896. First came a tariff revision downwards in 1913; then the creation of a new

ROOSEVELT—"TRUST BUSTER"



'Elisha Roosevelt Sicketh the Bears upon the Bad Boys of Wall Street' is the title of this cartoon by Joseph Keppler, Jr., in *Puck*, May 8, 1907. It refers to the President's efforts to regulate the railroads and the trusts.

banking and currency system under the control of the Federal Reserve Board (*see* Federal Reserve Banks). These laws were followed in 1914 by a new law, the Clayton Act, regulating the trusts, and a new Federal Trade Commission, to administer the laws and control business practises (*see* Federal Trade Commission). A Federal Farm Loan system, created in 1916, added to the machinery of control (*see* Farm Credit).

The Democrats claimed and deserved much credit for bringing these movements to a conclusion, but it must be admitted that most of the problems had received ample discussion during the years of Republican ascendancy. There was no important movement in the United States for going beyond government control all the way to Socialism, but both Democrats and Progressives were in agreement that the rights of the

common man were so gravely threatened by the combinations of big business, that to protect the citizen it was necessary to modify the character of the government and add to its powers. With this in view, the Constitution was amended, providing that senators should be elected by direct popular vote, and that Congress should have power to levy an income tax.

Before this period of the assertion of the national right to control industry for the common good could reach a climax, it was interrupted by the outbreak of the World War. Suddenly it became apparent how much the world had narrowed since the days of the Monroe Doctrine. The United States was reluctantly drawn into the World War, and when it emerged from this struggle, the appearance of the world was again changed.

8—*The Narrowing World, 1897–1917*

FOR more than 100 years after independence, the United States lived in a world of its own, in which no other power was great enough or near enough to arouse the fears or unsettle the imagination of the people. It had its differences with foreign countries, and settled them, often by arbitration, and sometimes by war. But no nation attacked it, and none seriously threatened to do so. The Monroe Doctrine was the chief expression of its policy towards the world, and president after president gave it his open support. The doctrine of neutrality was a great American contribution to international law; and after the Civil War the settlement of the *Alabama* claims and other controversies with Great Britain by arbitration seemed to be a great step forward in the paths of peace.

The peace was broken in 1898 by the sudden outbreak of the Spanish-American War. The cause of this war was sentiment, aroused by suffering in Cuba, and inflamed by yellow newspapers, whose circulation fattened upon the horrors of the insurrection there. The United States was unprepared for the war, and even less prepared for its results. When peace was made in December 1898, the United States found itself the possessor of Spanish colonies in the Philippines, of Porto Rico, and was committed to guide the people of Cuba to independent self-government. (*See* 'Alabama' Claims; Spanish-American War.)

Only five years later the United States was ready at last to build the Panama Canal, to serve commerce, and to assist in national defense. And it found that the possession of this canal, vulnerable and easily subject to hostile attack, raised new problems in connection with the maintenance of peace in Central America and around the Caribbean Sea. It found that the possession of the Philippines involved it in competitions in the Orient with the great powers of Europe, most of which were fully armed and quite ready to use their armies and navies for their own advantage. John Hay, as secretary of state, induced these rivals to accept the principle of the "open door" in China as basis of peace and equal opportunity. But in America, Roosevelt

and Taft and Wilson all had to deal with mixed problems involving the Monroe Doctrine.

The Latin republics of Central and South America had not generally objected to the use of the Monroe Doctrine as a means of defending themselves against European oppressors. Some of them took advantage of it, to decline to maintain order or to pay their just debts. In 1902, Roosevelt faced an intervention by England and Germany in Venezuela to collect their claims; he persuaded them to go to arbitration instead, but he saw that if the United States interfered with the collection of debts, the collector would hold it responsible for payments. In 1904, when Santo Domingo was in similar danger, he took over a financial protectorate of that country, to insure the payment of its lawful obligations. And Latin America, although willing to be protected, was irritated by the idea of intervention by the United States to keep order, or to compel the payment of debts. The United States was charged with "imperialism," and was criticized for exerting its power outside its continental boundaries. When, in 1903, Roosevelt assisted the state of Panama to become independent of Colombia, and then negotiated with it for a right of way for a canal, American relations with the Latin neighbors became tense indeed.

For the next ten years the problems of American interest outside its boundaries became more difficult, with strong opinions on every side of every question. In 1911 there was revolt in Mexico, and when President Wilson took office in 1913, another revolt there had brought forth a military dictatorship. Wilson declared that the United States would not annex any more foreign territory, but he continued the policy of using the navy and the marines as military police, and he was involved in many such problems when, in 1914, the World War, by its magnitude, drew attention across the Atlantic. President Wilson asserted and maintained neutrality among the warring European powers, and insisted upon the right of the United States to trade with all, in accordance with recognized provisions of international law applicable in time of

war. The fact that many Americans came from each of the European nations involved made it harder to see clearly into the confusion.

The United States had sharp grievances against all of the belligerents, because of their conduct of operations designed to cripple or ruin their enemies' trade and importation of foods and war materials. But as the war ran on, the grievances against the Allies proved to be chiefly commercial, of the sort that the United States and England had repeatedly settled by arbitration and the payment of damages, while those against the Central Powers, and Germany in particular, involved human life, because of the German determination to use the submarine in attack upon neutral and Allied ships which was not permitted by international law. The death of Americans could not be arbitrated, and when the *Lusitania* was sunk in 1915, war was near. It was avoided for the moment, and Germany

made promises to protect non-combatant life. The United States then entered upon a great program of military preparation, so as to be ready if war should come at last. The German government never asserted a right to kill Americans at sea, and justified its attacks only upon the theory that because the Allies violated the law it had a right to retaliate, regardless of consequences. In 1917 it decided to take the risk of antagonizing America, and to wage unrestricted submarine warfare against the Allies, apparently hoping to end the war by this means before the United States could become a dangerous enemy. The American response was to dismiss the German ambassador, and on April 6, 1917, Congress, by great majorities, declared that a state of war existed by the acts of Germany. The freedom of a neutral country to live its lawful life had been so challenged that the American people believed they must go to war.

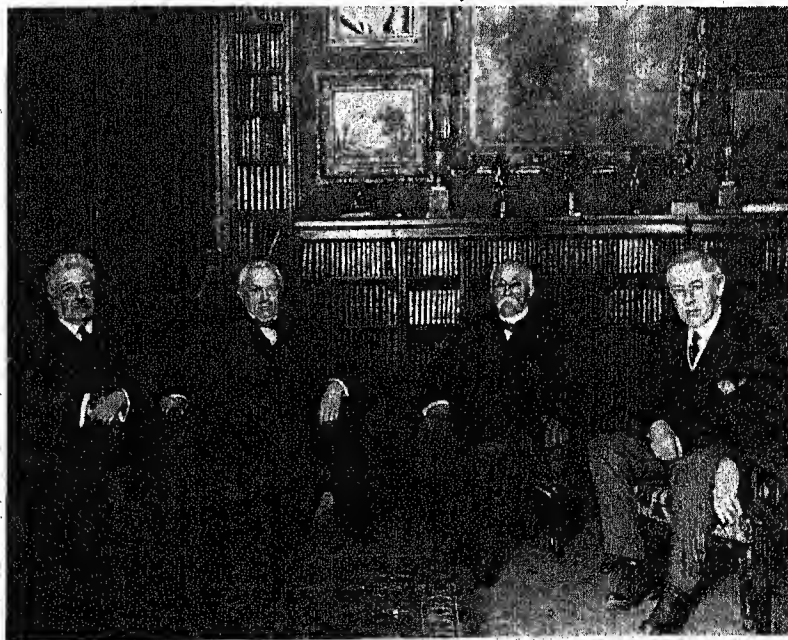
9—The Great Crusade, 1917–1920

IT WAS a great crusade for the United States—a crusade to “make the world safe for democracy” as well as to defend itself against aggression. The American people entered it with high hopes which were to fall far short of realization in the years of economic and spiritual bankruptcy that followed the achievement of victory. More than two million men were dispatched to Europe before the Armistice was signed. The navy was rushed into action alongside the fleets of England and France. Nearly ten billion dollars were loaned to the Allies to assist them in carrying on the war. American industry was reorganized with one dominant purpose, to win the war. Sacrifices were eagerly made in the hope that this war would end wars, and that after it there might be erected an association of nations that would be more effective in preserving the peace than the competitive armaments which most of the nations had been constructing. President Wilson became the spokesman not only of the United States, but of the common people in every country; and before the war ended even in enemy countries he was regarded as the leader of their hopes.

It was nearly a year after the declaration of war until the first American divisions were in condition to enter the line and carry a share of actual fighting. They might have been there sooner, if England and France had not opposed General Pershing's

fixed plan that the American army must fight as a unit under American command. They distrusted the ability of General Pershing and the American Expeditionary Forces (A.E.F.), and were unwilling to lend precious ships, reduced in number as they were by the ravages of German submarines, to take Americans to France, until in March 1918 the great German drive threatened to bring prompt defeat. Then the ships were provided, and the divisions came. Their quality was tested in the spring at Cantigny and on the Marne; they were used in the counter offensive of Marshal Foch in July;

THE “BIG FOUR” AT THE PEACE CONFERENCE



Here we see President Wilson meeting the prime ministers of the other great powers—Orlando of Italy, Lloyd George of Great Britain, and Clemenceau of France—to secure a lasting peace, after the World War. Most of the knotty problems of the peace were settled in outline by these men before they were considered by the other delegates.

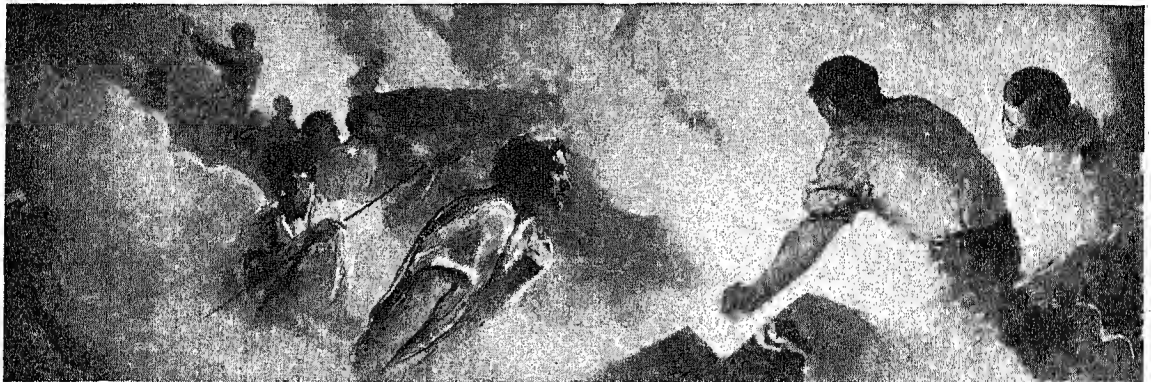
they managed their first army operation at Saint-Mihiel in September, and on September 26 they entered the greatest battle the United States has known—the battle of the Meuse-Argonne. The success of the A. E. F. as an army was a weighty factor in making victory possible for the Allies in 1918. (See World War of 1914–1918 and related articles.)

The leadership of Wilson formulated the terms, embodying most of his Fourteen Points, upon which the Armistice was signed. In the United States the high spirit of the crusade began to cool even before the delegations gathered in Paris to negotiate the peace. As day after day the conference dragged on, the ambitions of some of the Allies were gradually revealed, and it was soon clear that their support of the American purpose, of a “war to end war,” was not as real as they had claimed. While victory was in doubt they supported whatever the United States asked; with victory at hand, they were flushed with desire to get revenge, to appropriate German colonies and trade, to secure indemnities, and to prevent the

revival of Germany as one of the great commercial nations. Wilson accepted compromise after compromise, for the sake of securing the adoption of the Covenant of the League of Nations.

Before the treaty was signed, June 28, 1919—even before the Armistice was signed—there had been an election in the United States, and the Republicans had secured control of the Senate, to which the treaty must be submitted. Many of the Republicans objected to the League, fearing that in some way the independence of the United States would be endangered. And Wilson himself broke down, a physical wreck, before the treaty came to a vote. Twice it was rejected by the Senate, and Wilson from the sickroom called for a “solemn referendum” on the treaty in the presidential election of 1920. The Republicans nominated an anti-treaty senator, Harding, and elected him by a majority overwhelming in its proportions. The other nations set up the League, but the United States held itself aloof, and reverted to the foreign policies that had been typical of its politics since the Civil War.

10—New Problems in the New World



This mural painting of 'Labor', by John W. Alexander, is in the Carnegie Institute, Pittsburgh. It suggests the strenuous toil of large groups of workers, on which depends the mass production characteristic of present-day American industry.

AFTER the first World War, grave problems had to be solved. The government had to be reduced to a peace basis, its wartime rate of spending had to be cut down, and private business had to be revived. Since the United States refused to ratify the Treaty of Versailles, it signed special peace treaties with Germany and Austria in 1921. The United States did not join the League of Nations, and did not become a party to the general discussions of the European countries respecting their own reconstruction and the future. The United States was often represented through “informal observers” at European conferences, and sometimes cooperated in their results, but it avoided entering any combinations. Harding pursued this policy; Coolidge did the same; and Hoover, who was elected president in 1928 by a great landslide, showed no disposition to alter the policy. Steps were taken to make it easy for the Allies to arrange to pay their debts to the United States, but hard times in Europe made some of these slow in com-

plying. The world-wide depression beginning in 1929 brought such distress that in 1931 President Hoover induced all of the powers to agree to a moratorium for a year, that is, for a year they should all refrain from paying or collecting the national debts owing among themselves.

The Harding administration was troubled with scandals, as was the Grant administration after the Civil War, and Harding himself died in office before the worst of the scandals was uncovered. He had time, however, to reduce the expenditures of the government, to secure the adoption of a national budget system which Charles G. Dawes organized, and to call the great powers into conference at Washington in 1921 to undertake the limitation of armaments. Times were hard during the early part of his administration, labor was uneasy, farmers were upset, and in 1924 a Farmer-Labor movement brought forth the great Progressive, LaFollette, as independent candidate of these classes. Coolidge, however, won the

"HELLO, LONDON! THIS IS NEW YORK!"



Transatlantic telephone service began here on Jan. 7, 1927, when President Walter S. Gifford of the American Telephone and Telegraph Company spoke to England. The other officials of the company are listening. Five months later Charles Lindbergh flew alone from New York to Paris. As men were brought closer together by these and many other advances in communication in the 1920's, hope grew for lasting peace based on international good will—a hope that faded as inventive genius turned again to war. Ironically, transatlantic telephones then became one of the means of swiftly transmitting news from European battlefronts to America.

election. The country prospered during his administration, arriving finally at one of the greatest booms in the nation's history. But shortly after Hoover succeeded him in 1929, the boom broke and was followed first by a disastrous financial crisis and then by a deep business depression.

Hoover strove valiantly but in vain for a "return to prosperity." The 1930 elections stripped him of the support of Congress, and in 1932 the promise of a "New Deal" by the Democrats swept Franklin D. Roosevelt into the presidency.

The theory of the New Deal was that true prosperity lay not in a "return" to earlier conditions but in social and economic reforms designed to give greater security and higher incomes to the masses, particularly farmers and industrial workers. To this end the Roosevelt administration carried out a broad legislative program.

So sweeping were the New Deal reforms that some of its critics said the total effect was not reform but revolution—a fundamental change in the American system. But as the New Deal progressed, its chief tenets became fixed in the thinking of the vast majority of the people. The Republican party adjusted itself to the idea that government must play a larger rôle in the economic life of the country than it had before. It was taken for granted that the most significant New Deal measures in the fields of housing, public works, social security, and farm relief were a permanent part of American democracy. (See also Roosevelt, Franklin D.)

The Life of the People between Two World Wars

WHEN Americans in the decade after the first World War talked about their country, they were likely to use such terms as "the biggest," "the tallest," and "the largest number." There was reason enough for superlatives. The industrial civilization that they had been developing for more than half a century burst forth in the 1920's with

a brilliance that dazzled the world. The immense productive and inventive power of the nation, released from the grim duties of war, wrought miracles of technology and abundance. The Great Crusade was over. Now, with hopes of lasting peace and of a "return to normalcy," Americans looked to see the promise of the machine age fulfilled.

The wonders of the new era touched the life of almost every citizen. Automobiles crowded the curbs of the cities and towns. On Sunday the wide paved country roads were jammed, and in summertime the family automobile invaded every remote corner of the land. Offices were perched high up in skyscrapers that towered in streamlined magnificence over the crowded cities. In the home, refrigerators, electric irons, vacuum cleaners, and countless other gadgets lightened the housewife's duties. With new leisure for all, new forms of entertainment and recreation arose in bewildering variety. Millions of people every day poured into the motion-picture houses, and millions more enjoyed expensive entertainment at home by a switch of the dial on their radio sets. One after another, fads swept the nation—mah-jong, crossword puzzles, bridge, jazz, swing. Advertising whetted the taste for new products, new styles, and new games. Speed captured the nation's fancy, and the popular hero of the first decade was a young man who crossed the Atlantic alone in an airplane which he called *The Spirit of St. Louis*.

The keynote of the age was material prosperity. Business and trade expanded almost without effort and wages rose to unprecedented levels. Money flowed freely as a vast consuming public absorbed the goods and services of industry, which in turn gathered ever greater momentum. Science, liberally subsidized, offered new methods and opportunities for enterprising capitalists and new benefits for all. The "get-rich-quick" idea, which since pioneer days had been part of the American tradition, infected even the humblest workers. It was evidence of one's faith in the country to "take a flier" on the stock exchange, and with stocks

careening to dizzy heights, fortunes were indeed created overnight. A "golden glow," as one writer termed it, suffused the thinking of the American people as they contemplated a future of permanent peace and mounting prosperity.

To be sure, there was criticism of the "business civilization" that was enveloping the country. Striking at the very heart of the new society was the warning that mass-production methods were imposing a pattern of deadly uniformity on American life. Critics with this point of view conjured up a terrible picture of the average citizen in the machine age. He lived in an apartment almost exactly the same as all other apartments in the block and furnished with the same machine-made furniture. He rode to work in a standardized automobile, past standardized advertisements for standardized products. He derived his amusement (and, indirectly, his manners and morals) from the same motion pictures and radio programs as did millions of other Americans. He obtained his facts and formulated his opinions from syndicated news in dailies with mass circulation. And finally he sent his children to schools so large that the individual student became submerged in mass-production methods of education.

There were other criticisms too. Intellectuals ridiculed the "babbitts"—smug, intolerant businessmen who, intoxicated with the wine of prosperity, scorned culture and scoffed at new ideas. Moralists deplored the new freedom of the younger generation, its short skirts and bobbed hair, its smoking and drinking, its addiction to jazz music, and its readiness to resort to divorce. Everyone decried the prevalence of crime, admitting, however, that gangsterism was not unnatural at a time when a federal law—prohibition—was being openly violated even by respected citizens.

Some of these phenomena were but eddies in the main stream of American life. Many of them, however, grew out of a significant trend—the concentration of population in the cities. By 1920, more than half the people were living in cities or towns; and half of these lived in communities of more than one hundred thousand persons. Conventions adapted to an earlier America of small towns and rural families were no longer always effective rules of conduct in the swift-moving modern cities. The traditional pattern of family life, for example, was profoundly altered as

wives and daughters entered the outside working world in increasing numbers. Nor were the new folkways restricted to the cities. With the radio, the movies, and the popular magazines, even the rural districts quickly felt the impact of the changing times.

The possibility of continuing to use machines to the full, while avoiding the disadvantages of congested cities and gloomy industrial areas, was advanced by some theorists. They pointed out that the increasing efficiency of electric power generators and transmission lines would permit industry to "decentralize" and spread out into many small communities. The city of the future, based on electric power, was to be a "garden city," small, clean, and healthful, and yet pos-

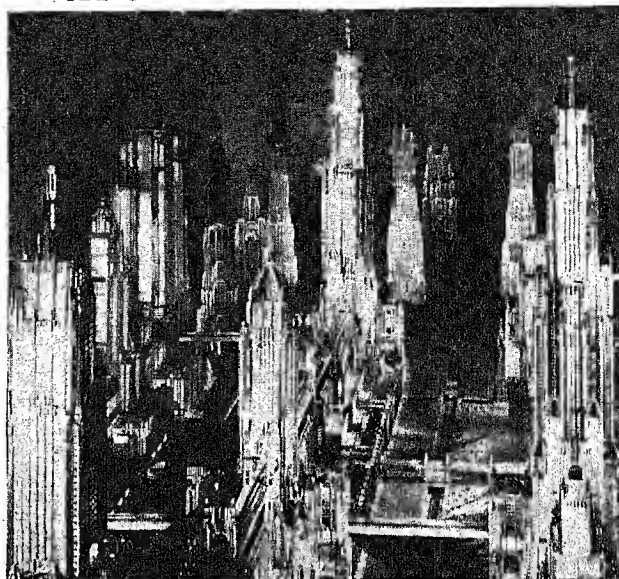
sessing all the rich opportunities for culture and diversion that a fully developed machine age could offer.

But the American people soon had to meet more urgent problems than these. The 1929 crash and the subsequent depression destroyed not only the economic structure of prosperity but also many of the modes of thinking and living that had flourished in boom times. With bread lines, unemployment, and financial panic, Americans were less inclined to worry about the younger generation or the standardization of life.

When President Roosevelt told the people that one-third of the nation was "ill-housed, ill-clad, ill-nourished," the golden glow of the 1920's was rudely dissipated. The dominant attitude became one of sharp questioning. In this "great nation, upon a great continent, blessed with a wealth of natural resources," why should millions lack for the very necessities of life? Few questioned the principles upon which the republic was founded; these were good principles, wise and enduring. But many did question the manner in which the principles were carried out.

They sought the answers, in the 1930's, with an intellectual fervor that the nation had not known since the Civil War. Books on democracy, history, and current affairs assumed an unaccustomed place on best-seller lists. One novel, dramatizing the plight of farmers driven out of the Dust Bowl lands, aroused such a storm that one had to go back to 'Uncle Tom's Cabin' to find a parallel. The traditional American indifference to government as a "necessary evil" was replaced by a lively concern with affairs of state

WILL CITIES OF 1975 LOOK LIKE THIS?



An artist pictures his version of the city of the future with many soaring skyscrapers and pedestrian and vehicular traffic on different levels.

and a readiness to keep the legislators informed of the opinions of "the people back home." Particularly imbued with this new spirit were the young people, whose earnest interest in current problems amazed their elders quite as much as had their frivolity in an earlier day.

Yet, no matter how grim the social scene or how zealous the crusading spirit, Americans did not lose their quick humor or their easy optimism. The times were never so bad that they could not joke. For their entertainment they continued to throng the movies, where heroes and heroines dwelt in a fabulous world utterly

removed from reality. The dance grew even wilder as the fad for "swing" music swept up young and old alike. Ever larger crowds were drawn to the great sporting spectacles, and if there was solemn discussion of the need of governmental planning, there was equally earnest talk of the merits of a favorite baseball player.

The undercurrent of the times was that the nation faced a serious crisis, perhaps the greatest in its history. There would be trials and hardships which would accentuate long-standing tensions; but that the nation would survive this test, as it had others in the past, few ever doubted.

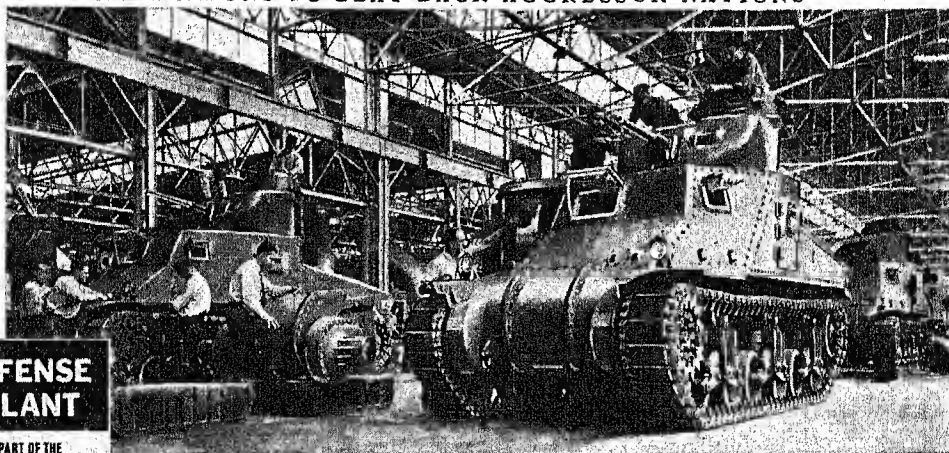
11—The Arsenal of Democracy

DURING the closing years of the 1930's, domestic issues were increasingly overshadowed by the troubled international situation, until finally in 1939 war in Europe blotted out almost all considerations other than those related to foreign policy. The issues raised by the New Deal, momentous as they were, shrank

a German threat. But the spirit which animated the people in the new war crisis lacked much of the fervor that had attended the Great Crusade of 1917. They were less inclined to be moved by patriotic slogans and military music. Rather did they regard "the final destruction of Nazi tyranny" as a grim business

PRODUCING WEAPONS TO BEAT BACK AGGRESSOR NATIONS

These giant 28-ton tanks are rolling off assembly lines in a huge new plant built by the Chrysler Corporation in a cornfield near Detroit. Automobile production was cut down to make way for the building of tanks and airplanes. Below is a copy of the government poster displayed in plants working on defense contracts.



DEFENSE PLANT

PART OF THE
**ARSENAL OF
DEMOCRACY**

into insignificance before the absorbing question of America's place

in a conflict that rapidly developed into a second World War (see World War, Second).

The American people were at first overwhelmingly opposed to becoming involved in the war. A substantial majority, according to polls of public opinion, held that it had been a mistake for the United States to enter the World War in 1917, and this belief no doubt was partly responsible for the first predominantly "isolationist" reaction to the new conflict. But after Germany's tremendous victories in 1940, most Americans came to believe that Hitler was a deadly threat to the United States. They then supported their government in a policy of aid to the nations fighting aggression—to make the United States, in the President's phrase, "the arsenal of democracy."

Thus, for the second time within a generation, the nation devoted itself to a struggle to free the world of

involving sacrifices which they were willing to make to insure the country's security.

These sacrifices, though they did not at first include military participation in the war, were heavy enough. As the arsenal of democracy, the nation launched a defense program so gigantic that it defied the imagination of the average citizen. Taxes rose to the highest point in American history; yet the revenue covered only a small part of the cost of rearmament, which would be paid by generations yet unborn. Peacetime production was disrupted and new government controls were extended throughout industry as the nation shifted to a war economy. For the young men, in addition to economic burdens, the crisis brought military conscription—the first time such a measure had been adopted in peacetime history.

That the defense emergency, piled upon years of depression and domestic strife, had sharpened the nerves of the American people was indicated during the presidential election of 1940. The campaign was

one of the most bitterly fought in American history, though both the Republican and the Democratic candidates were in virtually complete agreement on the supreme issue of foreign policy. President Roosevelt's unprecedented re-election for a third term showed that the nation was willing to break with tradition to retain his leadership in its hour of peril.

Nation United by War

When Japan began war against the United States on Dec. 7, 1941, followed four days later by Germany and Italy, all other issues were forgotten. Within the hour that brought news of Japan's attack on the

Hawaiian Islands, disputes and differences were swept away in a wave of patriotic emotion. Even before the government had had time to take official action, it was evident that the country had been drawn together by a sense of national unity unequalled in the history of the American people. Gone was the long tension over the conflicts abroad and the uncertainty about the course the United States should follow. America was in the war and would see it through.

The history of the part played by the United States both before and after its entry into the war is told in the articles NATION AT WAR; WORLD WAR, SECOND.

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Our American Heritage—an Outline



THE VERY foundations of American democracy and freedom are now threatened by world forces bent on destroying them. This threat has aroused in the American people a new and eager interest in the principles that underlie their national life. They want to understand clearly the things to which they, as a people, are dedicated—the principles for which they are now fighting.

The manner in which Americans meet the threat will be determined by the kind of nation they have built. The fabric of their past is the pattern also of their future.

This is what we mean by the "American way." It is the character the nation acquired as it grew. To chart that character, as it is represented in these volumes, is the purpose of this outline.

I. The People Came from Europe Looking for Freedom:

(They found wilderness and Indians—and it was a question which was the more savage. But they did not turn back, these bold colonists. Let the Old World perish! They had a New World to conquer!)

A. They Left England and Crossed an Ocean: A-150-1, J-183.

- a. Some sought freedom of worship: P-261, A-150-1, 154, M-91, M-77-8.
- b. Others wanted freedom of economic opportunity: A-150-1, G-58, V-307, N-121.
- c. Still others looked for adventure in the mysterious New World: A-144-5, R-49.

B. Among Their Number Were Many Brave Men:

- a. John Smith was a natural leader: S-164-5.
- b. Roger Williams risked death for his convictions: W-104.
- c. William Penn pioneered in democracy: P-110-11.

C. Self-Government Began Early: A-153, 154.

- a. Most of the people were small independent farmers: A-156-7, 160-1, U-234.
- b. They elected representatives and ran their government: A-153, 154, T-117, G-59.
 1. The Mayflower Compact set up democratic rule: M-92.
 2. Connecticut adopted the first modern written constitution: C-340.

D. The Colonies Soon Became a Melting Pot: A-155-6, A-160-1.

- a. Immigrants came from Germany, Ireland, Holland, Sweden, France, and other countries: N-159, N-92, N-121, A-145, F-110, P-116, D-41.
- b. The variety of nationalities and religions gave rise to a spirit of tolerance: A-155, C-233, P-116, M-78, U-235.
- c. Presently the New World was home to a new people—the Americans: U-233-4, A-161.
 1. They had their own language, different from the English spoken in England: A-161.
 2. They had their own commerce and industry: U-234, A-157-60, 173-4.
 3. And they had their own ideals: U-235, R-84.

II. A Nation Founded by Revolution:

(The Americans were strange. In a world of tyranny they dared to say—every individual is born with the rights to life, liberty, and the pursuit of happiness! To win these rights, the Americans fought a war. Thirteen colonies versus the British Empire—that was the line-up. Almost everyone said it was crazy. But they did it. They built a nation and became heirs to a continent.)

A. Background of the Fight:

- a. British officials abused their power: R-82-5.
 1. King George III quartered armies in peaceful communities: R-82, 86, D-27.
 2. The English Parliament imposed burdensome

economic restrictions: A-159-60, R-82-3, S-269-70, V-308.

3. Even British leaders like Burke and Pitt protested against the King's policies: B-278, C-156, R-86.
- b. Widening gulf between the colonies and the mother country: R-84-5.
 1. American democracy, wilderness-bred, became opposed to British aristocracy: R-84, V-288, N-159, S-216.
 2. The Americans, now 2½ million strong, resented the rule of a nation 3,000 miles distant: R-84-5, V-308, A-16.
- B. Flaming Words and Flaming Muskets: R-98, N-122, N-134, N-92.
 - a. American "Indians" staged a "tea party" in Boston: R-83.
 - b. Continental Congress — first stirrings toward unity: R-85, 87, 89, S-216.
 - c. Paul Revere's Ride—"The British are coming!" R-81.
 - d. The Minutemen stood firm: Lexington and Concord L-100; Bunker Hill B-271-2.
 - e. Tom Paine said it—Independence! P-12.
- C. The Battle for Freedom:
 - a. Declaration of Independence proclaimed a new society: D-27-30, L-90, picture R-81.
 - b. In freedom's defense arose great American heroes: Franklin the diplomat (F-189-90), Patrick Henry the orator (H-279-80), Washington the soldier (W-12-22), Jefferson the statesman (J-206-9), Israel Putnam the rugged fighter (P-371); and the humble farmers and mechanics who fought in the ranks: R-87.
 - c. They were joined by many brave foreigners like Lafayette of France (L-54), Pulaski and Kosciusko of Poland (P-365, K-40), and Steuben of Germany (S-287).
 - d. There were exploits of unsurpassed daring:
 1. Ethan Allen taking Ticonderoga: A-128, picture R-88.
 2. Washington crossing the Delaware: R-90.
 3. John Paul Jones capturing the *Serapis*: J-226-7, R-88, picture R-90.
 4. George Rogers Clark conquering the Old Northwest: R-92, C-259, picture U-236.
 5. Sevier storming King's Mountain: R-91, S-85, S-216, T-48.
- D. Out of Revolution a New Nation—the United States:
 - a. Articles of Confederation loosely united the 13 states: A-317, U-236, S-279.
 - b. To form a "more perfect union" they adopted the Constitution: U-206-19, U-236, V-308, N-88.
 - c. Then, to safeguard the individual liberties of each citizen, they appended a "Bill of Rights": U-210, 216-17.
 - d. They had created a republic founded on democracy: U-236, R-92, D-47.
 - e. The Stars and Stripes became its symbol: F-85-6, 91-2.
 - f. And, in the later struggle of 1812, the 'Star-Spangled Banner' was adopted as its anthem: N-24, 25.

III. Democracy Grew as the Frontier Moved Westward:

(Raw, reckless, with the vigor of a growing giant, America advanced from colonies to nation and from nation to empire. As the frontier pushed to the Pacific, the Americans marveled at their continent—at its incredible wealth, its vast proportions, its sprawling loveliness. It was a heroic setting for their experiment in freedom.)

A. The Americans Drove to the Pacific:

- a. They followed paths broken by early explorers and missionaries: A-146. Champlain C-138; Marquette and Joliet M-67, J-226, I-18; La Salle and Tonty L-66, L-208, I-13, I-50; Hennepin H-274, M-203; Nicolet W-122, 126, M-154.
- b. They took the land: U-181.
 1. By the irresistible advance of the people: U-237-8, 241-2, F-14-17, S-224.
 2. By dispossessing the Indians: I-68, P-221k-l, F-15.
 3. By fantastic bargains, such as the Louisiana Purchase: L-208-9, U-242 map.
 4. Even by war, as with Mexico: M-131-2, C-327, P-296, C-33, T-20, S-51.
- c. Free land attracted a steady stream of settlers: U-237, L-59-60, P-221e, k, S-220, U-183-5.
- d. Discovery of gold brought a swarm: C-34-5, S-1, P-221h, F-17, C-309, 314, N-78.

B. Pioneer Days Produced Rough-and-Ready Heroes:

- a. Daniel Boone led his band across the mountains into Kentucky: B-192, K-13.
- b. Lewis and Clark traversed the continent: L-99-101, M-212, F-14.
- c. "Kit" Carson, John C. Fremont, and Zebulon Pike explored the western plains and mountains: F-14, 16-17, C-87-9.
- d. Fur traders penetrated the northern wilderness: F-223-7, F-14, S-219, N-165.

C. Democracy Flowered on the Frontier:

- a. The pioneers were self-reliant and independent, yet coöperative: U-239, P-221c, f.
- b. They were prodigal of nature's resources: A-48.
- c. They dispensed justice with rude honesty: U-239, P-221g.
- d. And they became a power in the nation: U-238.

D. New Agricultural States Brought a Fresh Western Breeze:

- a. The state constitutions followed the liberal pattern of the Federal Constitution: S-278.
- b. The backwoods produced leaders of a new variety: U-238.
 1. "Davy" Crockett couldn't read but he talked himself into Congress: C-398.
 2. Andrew Jackson represented the "common man" in the White House: J-177-90.
 3. After Jackson came other presidents from the South and West: H-231-2, P-295-7, T-20-1.

E. Democracy Moved from Theory to Practise:

- a. The system of checks and balances was perfected:
 1. It consisted of the executive (P-343-4), the legislative (C-332), and the judicial (C-385).

2. Marshall established the authority of the Supreme Court: M-70-1, U-211.
 - b. The two-party system developed: P-291-2.
—Opposing ideas of Hamilton and Jefferson laid the foundation: H-205, J-208.
 - c. The Alien and Sedition Laws were rejected as attempts to abridge liberties: A-127, U-236.
- F. The Republic Adopted a Foreign Policy of "Isolation":
- a. George Washington — avoid "entangling alliances" with the Old World: W-20, N-75a.
 - b. Monroe—keep the Old World out of America: M-241-2, M-239.
- G. Democracy's Culture—It Seemed "Barbaric" to Aristocratic Foreigners, but the People Liked It:
- a. Because it offered education for every citizen: E-177-9, 181-3, N-171, S-40, L-60.
—Horace Mann, missionary for knowledge: M-53, E-178.
 - b. Its press was free: N-106, N-122.
 - c. Its religious spirit was unrestricted: C-233, U-239.
 - d. Its social life was homely and informal: U-239, 240, 243.
 - e. And its literature sprang from the life of the people: A-177, U-243.

IV. The Nation Tested by Internal Strife:

(Yes, the young republic grew. But was it outgrowing the bonds that held it together? Were the very energy of its growth and the force of its freedom destined to split it asunder? The test was at hand—"whether that nation or any nation so conceived and so dedicated can long endure.")

A. Grave Issues Divided the People: C-248-50.

- a. There was the question of States' Rights: S-279.
 1. Webster said, "Liberty and Union, now and forever, one and inseparable": W-62.
 2. Calhoun said that a state had the right to nullify a federal law: C-24.
- b. There was the tariff question, with the industrial North opposed to the agricultural South: U-244, T-13b.
- c. There was the question of slavery: U-244.
—And the Abolitionist movement led by Garrison (G-17) and Sumner (S-325).
- d. All efforts at peaceful compromise failed: C-251, M-210, C-327.
—Despite the genius of Henry Clay: C-261.

B. War Broke Out Between the States: C-252.

- a. They fought it out on the battlefield: at Fort Sumter (F-160), at Bull Run (B-271), at Shiloh (S-116), at Antietam (A-221), at Fredericksburg (F-193), at Chancellorsville (C-139), at Vicksburg (V-293), at Gettysburg (G-81), at Chattanooga (C-156), in the Wilderness Campaign and at Petersburg (C-255), and at Atlanta (A-358).
- b. Both sides produced great leaders:
 1. In the North Lincoln towered granite-like: L-139. And with him stood Sherman (S-115), and Sheridan (S-114), and the unconquerable Grant (G-132).

2. In the South shone the nobility and genius of Robert E. Lee: L-90. And with him Jefferson Davis (D-19), Stephens (S-285), and "Stonewall" Jackson (J-180).

C. In the End, the Nation Stood the Test and There Were Abiding Results for Democracy:

- a. The slaves were emancipated: E-257.
- b. Constitutional amendments reinforced the liberties of every citizen: U-210-11, U-257.
- c. Never again did the threat of secession seriously arise: S-280.

V. A United Nation Waxed Rich and Powerful:

("Government of the people, by the people, and for the people shall not perish from the earth." Abraham Lincoln said that was the issue. And when the passions of war had subsided, everyone agreed. It did not, it shall not perish. So the wounds healed and the nation grew wondrously. It flung skyscrapers into the heavens; its ships encompassed the earth. And it became a refuge for the oppressed, a proper land for the brave and the bold.)

A. With War's End Came Tremendous Developments: U-245-7, I-74j.

- a. Natural resources were exploited more intensively and new enterprises were launched: U-185-6.
- b. The magnet of high wages drew waves of immigrants from Europe: I-22-3.

B. American Inventive Genius Was Born and Grew Up with the Nation: I-115 picture.

- a. There had been men like Fulton of the steamboat (F-217), Whitney of the cotton gin (W-95), Howe of the sewing machine (H-246), McCormick of the reaper (M-3), and Morse of the telegraph (M-261).
- b. And now came Bell of the telephone (B-93) and Edison the electrical wizard (E-159).

C. Railroads and Communication Lines Webbed the Land: R-37-8, T-125-6, T-32, T-34-5.

D. The United States Became the Greatest Industrial Nation in the World: I-74j-I, U-188a pictograph, U-193 graph.

- a. It had abundant raw materials and a vast domestic market: U-194-8, E-322b pictograph.
- b. Great fortunes were built up by oil kings like Rockefeller (R-122), steel kings like Carnegie (C-85), merchant princes like Wanamaker and Marshall Field (H-228).
- c. And presently came the automobile industry: A-388-90.
 1. Led by Henry Ford, it worked out mass production methods: F-152.
 2. With it came an amazing program of highway building: R-112-14.
- d. The Wright brothers invented the airplane and America took to the air: W-183, A-80.
- e. Electric power transformed the life of the people: E-233, 236-7.
- f. De Forest and Armstrong perfected the radio and vast broadcasting networks brought the people closer together: R-27, 30, C-324c-d.

E. Out of This New Industrial Revolution Came the Modern American Pattern: U-251-2.

- a. Great cities thrived with industries and people: C-240-2, I-74f pictograph.
- b. "Big Business" grew and consolidated: I-74j.
- c. The American labor movement followed a typically independent course: L-44-44b, d.
- d. The American farmer learned how to produce more at lower costs: A-49, A-50 pictograph.
- e. Mass consumption of mass-produced products created the "American Standard of Living": I-74n, L-93a, A-23.

- c. And they tried to improve the living conditions of the underprivileged:

—They provided for employers' liability (E-263) and they started many other kinds of social insurance (S-179).

B. The Nation Was Coming of Age:

- a. Its land frontiers were disappearing: M-168, C-115.
- b. It began to restrict immigration: I-23-4.
- c. It became a world power: U-248-50, M-15-16.

C. Its Culture, Too, Assumed Large Stature:

- a. American literature, freed from dependence on Europe, ranked among the greatest: A-180-83.
- b. Painting, sculpture, and music also flourished: P-26-9, S-62-4, M-316-17.
- c. Its great institutions of learning and research were unrivaled: U-258-60, I-75.

D. Ever Stronger Grew the People's Faith in the "American Way":

- a. They were devoted to the paths of peace: P-91-2.
- b. Yet twice in twenty-five years they went to war for democracy: U-249, W-166, W-178w.

VI. Old Ideals Found New Expression:

(It was time to take stock. The Americans, abating their breathless expansion, began to look at one another. They found that in the swift race many had been left behind. They found injustice—poverty in the midst of plenty. So they crusaded for reform. They found their culture backward. So they rushed to "conquer culture" as they had the West. But their achievements were great, and greatest of all was this—they had made democracy work!)

A. The Americans Sought to Perfect Their Democracy:

- a. They broadened popular participation in government:

—They provided for direct primaries (P-345), initiative, referendum, and recall (I-78), direct election of senators (T-3), and suffrage for women (W-132).

- b. They regulated industry in the interest of public welfare: U-247-8.

—They launched the anti-trust movement (T-146); they set up the Interstate Commerce Commission (I-110h) and the Federal Trade Commission (F-22).

VII. New Problems in the New World:

(This American—this Uncle Sam, lean and tall, awkward, abundant in his love, stern in his sense of justice—this American—born in revolution, cradled in a continent, maturing in a world of violent change . . . how will he fare? Let us follow his progress in our own time. Let us look into his record as set forth in the Outline for Current Events—pages H-310c-h.)

The preservation of the sacred fire of liberty, and the destiny of the republican model of government, are justly considered as deeply, perhaps as finally, staked on the experiment entrusted to the hands of the American people.

—George Washington

I know of no safe depository of the ultimate powers of society but the people themselves; and if we think them not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion by education.

—Thomas Jefferson

Long, too long America,
Traveling roads all even and peaceful you learn'd
from joys and prosperity only,
But now, ah now, to learn from crises of anguish,
advancing, grappling with direst fate and
recoiling not.

—Walt Whitman

America is not anything if it consists of each of us. It is something only if it consists of all of us; and it can consist of all of us only as our spirits are banded together in a common enterprise. That common enterprise is the enterprise of liberty and justice and right.

—Woodrow Wilson

So, then, to every man his chance—to every man, regardless of his birth, his shining, golden opportunity—to every man the right to live, to work, to be himself, and to become whatever thing his manhood and his vision can combine to make him—this, seeker, is the promise of America.

—Thomas Wolfe

We can no longer take our own way of life for granted—we know that it may be challenged. And we know this too—and know it ever more deeply—we know that freedom and democracy are not just big words mouthed by orators but the rain and the wind and the sun, the air and the light by which we breathe and live.

—Stephen Vincent Benét

Winning the KNOWLEDGE that is POWER.



Who wouldn't enjoy going to college in such surroundings as these? The campus of Cornell University, which is here shown, overlooks Lake Cayuga in New York State and is famous as one of the most beautiful college settings in the world.

UNIVERSITIES AND COLLEGES.

Ancient Greece and Rome had their schools of rhetoric and philosophy, and Mohammedanism developed great schools for religious teaching in Egypt, Turkey, and Asia; but the universities and colleges of today trace their origin chiefly to institutions originally fostered by the Christian church in medieval Europe.

In Germany and elsewhere in Europe the word "university" ordinarily means an institution of advanced rank where students of mature age follow courses in law, medicine, theology, philosophy, and the like. In the United States there is no sharp line between the "college" for general cultural studies, and the "university" for postgraduate work, research, and professional courses in law, medicine, and other subjects. In general a university is a larger and more advanced institution than a college; but usually an American university also includes in its organization a division which gives undergraduate work in the cultural subjects, like the ordinary college. Such a division is called the "College of Liberal Arts," "College of Science, Literature, and Arts," "College of Humanities," or some similar name.

The degree most commonly granted to graduates of the liberal arts course is the B.A., also written A.B., which means Bachelor of Arts. The equivalent degree

NEVER before has the old adage that "Knowledge is Power" been so true as in these days when scientific experts—in engineering, manufacturing, agriculture, law, medicine, and a hundred other lines—are mastering the boundless universe; and never before has the investment in a university education paid such large returns on the outlay! This article offers to the boy or girl about to go to college helpful guidance in the selection of a school, and after that, in the choice of college studies. It also sketches briefly the history of universities and colleges from the distant days when Abelard lectured in his bleak Paris lodgings to students huddled in the straw on the floor, to the superbly housed universities of today, with vast libraries, laboratories, dormitories, and playing fields, and faculties of scholars whose researches in the many fields of history, science, and other branches of learning daily advance the limits of man's knowledge.

B.Sc. (Bachelor of Science) is conferred on students who have specialized more fully in the scientific subjects. To those who have successfully completed at least one year of postgraduate study, the degree M.A. (Master of Arts) or M.S. (Master of Science) is granted. The degree of Ph.D. (Doctor of Philosophy) or D.Sc. (Doctor of Science) is awarded to those who

have completed three years of postgraduate work and show by the publication of a thesis that they have the ability to carry on independent research.

The completion of professional courses earns other degrees. A graduate from a medical course receives the degree of M.D. (Doctor of Medicine), while graduates in the law course receive the degree LL.B., that is, Bachelor of Laws, or, if they have taken an undergraduate course, then a law course of three years, the degree J.D. (Doctor of Law). (For other degrees, see Abbreviations in Fact-Index.)

There are many other occupations and professions for which colleges and universities offer training and grant diplomas and degrees. Some of the most important of these are agriculture, forestry, pharmacy, dentistry, nursing, accounting, government service, home economics, library work, engineering, architecture, and journalism. In many states, only those who have secured a college degree from some approved

institution can enter certain occupations and professions, such as the practise of medicine, law, dentistry, and so on.

How Colleges Are Organized

Colleges in the United States have the following general plan of organization: the student body, with class presidents, secretaries, and treasurers; the recorder, or registrar, who enforces entrance requirements and keeps records of credits; a dean of men and a dean of women, who advise students on personal problems and direct student activities; dean of the college, who, as head of the faculty, has broad administrative powers, especially in details of instruction and faculty appointments; the president, the chief administrative officer in all matters; and the board of trustees, whose interest is chiefly with financial matters and plans for development. Each department is primarily responsible for the content and organization of its courses. Usually each has a chairman, sometimes called the "head"; and well-defined ranks for its teachers: assistant instructor, assistant professor, associate professor, full professor. In addition, there may be lecturers, who give part-time instruction. The title "visiting professor" is given a professor from another college who has been invited to give instruction for a short period, usually a year or less. In the athletic department there may be a coach with assistants; and usually in the larger colleges and universities, a chairman of all athletic activities, who selects coaches for each type of major athletics. Sometimes the chief coach for one sport, such as football, is aided by a staff of experts.

Degrees are conferred at a time of impressive ceremony, commonly called "commencement" in American universities and colleges. The earliest use of the term is in a statute of 1387 of the University of Oxford; the word literally means a time of beginning a career outside of academic surroundings. The commencement season is marked generally by a week of class reunions and social events and is brought to a close by the formal conferring of the degrees.

Why Should I Go to College?

There are two chief reasons for going to college. The first is that college offers a preparation for a useful life and a training which enables you to render efficient service to your fellow men. The second is that a college education increases your earning power and your chances for success. This has been strikingly shown by a study of the reference work entitled 'Who's Who in America', containing the names of living men and women who have become eminent. A study of one issue of this work showed that 85 per cent of those listed had received college training, while 73 per cent had received college degrees. This would indicate that a college education tends to increase one's chances of becoming a citizen of influence and importance.

But college has other things to offer besides instruction and professional preparation. The social life, if you enter into it rationally and without overemphasis, will play a valuable part in developing you and in

preparing you to mingle with your friends and fellow citizens. This social life has given rise to debating clubs, literary clubs, dramatic clubs, musical organizations, such as glee clubs, bands, orchestras, and to religious associations.

As in high school, so in college, games and athletics hold a high place. Recognizing that physical pastimes arouse interest in physical development, most colleges provide fine gymnasiums, athletic fields, and facilities for outdoor sports, such as tennis, football, and baseball. Most of the large universities of the country have great permanent stadiums for athletic events, some seating as many as 80,000 spectators.

Fraternities and Sororities

At many colleges there are secret organizations called fraternities (for men) and sororities (for women). They are also called Greek-letter societies, because most of them use a combination of Greek letters for their names. Admission into them is only by invitation, never by application. Originally organized as self-improvement associations, they have in some instances become exclusive clubs whose mode of life is opposed to democratic principles. The oldest Greek-letter society, Phi Beta Kappa, founded in 1776, long ago abolished all secrecy and is now an honor society composed of those who distinguish themselves as students. There are more than 80 other such honorary fraternities and sororities. (For a list of college social fraternities and sororities, see Fraternities in Fact-Index.)

Greek-letter fraternities and sororities are distinctive features of college life in the United States, but there are no such organizations in the universities of Europe. In the British Isles, social life centers around the separate "colleges" which make up the university (see Oxford).

Coeducation and Women's Colleges

Some colleges are open to men only, others to women only, still others called "coeducational" to both. Certain men's colleges maintain or are affiliated with colleges for women. Examples are Radcliffe College at Harvard, and Barnard College at Columbia. The most widely known women's colleges in the United States are Bryn Mawr, Vassar, Smith, Mount Holyoke, Wellesley, Goucher, and Wells.

Every state in the Union has a state university or a state college of some sort. Among the best-known state universities are those of California, Illinois, Michigan, Minnesota, and Wisconsin.

Some cities have established local colleges and universities supported and controlled by the city itself, with the idea of bringing educational advantages to the community, instead of sending the community's youth to distant educational centers. The municipal college endeavors to provide a higher education for all citizens of whatever age, and at a cost within the reach of all. Well-known institutions of this type are the College of the City of New York, the College of the City of Detroit, and the universities of Cincinnati, Akron, and Toledo.

Many of the colleges and universities in the United States and Canada are controlled by some religious denomination. But more renowned are certain private non-denominational colleges and universities which have provided the education, generation after generation, of social and intellectual leaders. In this group must be included, first of all, Harvard, Columbia, Yale, Princeton, and the University of Pennsylvania. Two institutions not as old but of the same general character are Cornell University and Stanford University. New England has long been proud of its historic group of smaller colleges, noted for their excellent academic standards, such as Dartmouth, Bowdoin, Williams, and Amherst.

What the Morrill Act Did

Every large university and many smaller ones have courses in engineering and other technical subjects, especially state institutions, because of the assistance they receive from the Federal government. In 1862 Congress passed an act known as the Morrill Act, which granted government lands to the states to aid them in establishing colleges of agriculture and mechanical arts. Some states, such as Wisconsin and Minnesota, established an agricultural college as a part of their state university. Others, like Washington, Michigan, Iowa, and the New England states (except Maine), set up separate institutions. There are colleges which have nothing except technical courses, such as the Massachusetts Institute of Technology (coeducational) and Simmons College (for women).

Recently there has been a marked tendency away from traditional methods of instruction in an endeavor to adjust higher education to the needs and aptitudes of the individual. In many colleges freshmen and sophomores are offered *orientation courses*, designed to survey many fields—political, social, and natural sciences, history, culture, and present-day civilization. Besides furnishing a general background, such survey courses are intended to open up the student's interest and guide him into a special field.

The *honors courses* at Swarthmore, Dartmouth, Rutgers, Miami, Stanford, and some other colleges grant advanced students of demonstrated ability a certain amount of freedom in developing along the lines of their choice. The exceptional student is not compelled to keep step with the average student. Under faculty supervision he pursues an independent plan of study, checked by reports and examinations. Another method for encouraging individual progress is practised at Rollins College, which replaces lectures and examinations by a system of conference groups.

The college plan of the University of Chicago abolishes course credits, course examinations, and time requirements. Comprehensive examinations, taken when the student feels he is ready for them, are the main criteria for granting degrees or measuring progress. Attendance at class lectures is optional. The beginner must enter the lower division, or "college," where he may obtain a general education, normally requiring two years for average students,

but less time for superior students. Whenever he passes the general education test, he qualifies for entry into one of the four upper divisions: the Humanities, the Social Sciences, the Physical Sciences, or the Biological Sciences. Here again his work is mostly individual, though under faculty guidance. He merits a degree when he passes the comprehensive divisional examination in his chosen field.

In an endeavor to combine practical experience with academic study, Antioch College, at Yellow Springs, Ohio, offers a five- or six-year course in which the time is equally divided between the classroom and outside related employment. Such a cooperative system is now practised by several other technological institutions.

Before choosing your college write to the registrar of every institution which interests you and ask for its catalog. This is the best way to make an intelligent choice. The size and training of the faculty, the number of volumes in the library, and the annual income are all clues to the rank of the institution. Your decision will depend upon what you wish to gain. If it is your desire to continue your general education, then the smaller college will have much to offer you. If, however, you propose to prepare for some profession, the larger institutions, with their immense libraries, finely equipped laboratories and shops, should receive your careful attention.

Scholarships and Fellowships

Scholarships and fellowships for deserving students are available in most colleges and universities. The ordinary scholarship is a cash sum or the income from an invested fund. Awards are made according to the terms of the trust to undergraduates, to needy students, to state residents, to superior high-school students, and to those of "service" to the college. Honor scholarships are won by scholastic ability without regard for need, for example, Rhodes scholarships (see Rhodes, Cecil). Fellowships are like scholarships except that they are awarded to graduate students, known as "fellows," and the amounts are usually sufficient for a year's maintenance. Educational loans are gaining in favor; over \$4,000,000 is available in 300 colleges and many outside agencies.

Scholarships and fellowships to the extent of at least \$10,000,000 are distributed annually to over 50,000 students. The chief sources of financial aid are: (1) the colleges and universities; one out of four of these awards is a "service scholarship" where the student is required to do some service in the college such as teaching, janitor or domestic work, research, office, laboratory, or library duty; (2) private individuals and friends; (3) state appropriations for aid of state residents or ex-service men in a number of states; (4) clubs, societies, alumni, industries, and the like; (5) churches and religious denominations; and (6) miscellaneous agencies.

Large sums are appropriated annually for fellowships and scholarships by the Rockefeller Foundation, the General Education Board, and other great philan-

thropic organizations (see Philanthropies and Charities). Of more than ordinary interest are the awards established to promote international understanding. The American Council of Education sends students to English, French, and Spanish universities; the Commonwealth Fund awards fellowships to British students wishing to study in America; and the American-Scandinavian Foundation brings Scandinavian students to America, and American students to Scandinavian countries.

Of the 34,014 scholarships and fellowships awarded in a recent year in 402 colleges and universities, 28,928 were for undergraduates only, 4,370 for graduate study only, and 716 were not designated. The number of years that a student may hold a scholarship is not generally stated, but 9,710 were for four years, and 7,422 for one year. More than 100 scholarships are awarded annually in each of 78 institutions located mainly in Illinois, New York, Pennsylvania, and the New England states.

If you wish to go to college and have not sufficient funds, send a letter to the registrar of the college of your choice asking him what chances there are of getting a scholarship and also of earning your way. Thousands of boys and girls are earning a large part or all of their college expenses. What is most needed is a good mind and determination and willingness to do well whatever comes to hand.

Beginnings in Medieval Times

Modern colleges and universities are the result of centuries of educational experiment. Their roots go back to the medieval university of the 12th or 13th century, an outgrowth of schools connected with the cathedrals and monasteries. When some popular teacher, as Abelard (see Abelard, Peter) or Peter Lombard drew crowds of students, there usually followed a corporation to which was given the name of *universitas*, meaning "all of us" or "the whole body." Some of the early universities, as that of Paris, were formed by the "masters" or teachers; while others, as Bologna, were corporations of the students. In Paris there were 30,000 students, it is said, in the time of Abelard.

The chief purpose of these early universities was to educate priests, and both students and masters wore gowns which marked them as clergy. Since the instruction was in Latin, every great university was attended by students from various countries.

The degree of "doctor" or "master" at first entitled the person who received it to teach in the university giving the degree. Pope Nicholas III near the end of the 13th century granted the University of Paris the right to endow its graduates with the power to teach anywhere. The degree of "bachelor," borrowed from the terms used in knighthood and indicating an imperfect or partial graduate who had finished only the lowest stage, was first introduced at the University of Paris in the 13th century. The "liberal arts" (Latin, grammar, rhetoric, logic, arithmetic, geometry, astronomy, and music) were studied in what we

should call the "undergraduate" course; beyond these lay the faculties and courses of theology, law, and medicine. The colleges, as the different schools connected with a university are called, at first were mere boarding-halls, which were later appropriated to the faculties of different departments.

Paris and Bologna, the Mother Universities

Nearly all universities stem from those of Paris and Bologna. That of Salerno, however, abolished by Napoleon in 1811, was probably Europe's oldest. Its medical school dated from before the 11th century. The University of Bologna, chartered by Frederick Barbarossa in 1158, specialized in Roman and canon law. The University of Paris, founded between 1150 and 1170, stressed theology and philosophy. It is also known as the Sorbonne, from the college which was formerly its theological school.

Oxford claims to be England's oldest university. It dates from the 12th or early 13th century (see Oxford). Cambridge was founded about the same time. St. Andrews (1413) is the oldest in Scotland, and Dublin (1591), the oldest in Ireland. Pope Clement V had granted the town of Dublin a university as early as 1312, but the school was not opened for nearly three centuries. Like other schools, similarly authorized but not opened, it was called a "paper university."

The University of Prague (1347-48) is the oldest in central Europe. It followed the pattern of the University of Paris, as did the University of Vienna, founded in 1365. Heidelberg (1385-86), oldest of the German universities, was patterned even more closely on Paris. Scandinavia's first university was founded at Uppsala, Sweden, in 1477, and Holland became a center of European learning with the founding of the University of Leyden by William of Orange in 1575. But long before these schools had reached their height, Spain's University of Salamanca (founded before 1230) boasted 10,000 students and 28 colleges.

Of great importance today are the many municipal universities, such as the University of London (1836). This is a federation of many colleges in and about London. In some years, it has enrolled more than 35,000 students, including outside students preparing to take degrees by examination.

Canada has many notable colleges and universities, some of which are Toronto University; McGill University (Montreal) and Laval (Quebec and Montreal); Dalhousie (Halifax); and the universities of Alberta, Saskatchewan, Manitoba, and British Columbia. (See also Education.)

URAL MOUNTAINS. There are no towering peaks in the Urals—the longest mountain chain in Europe. In a country less flat than Russia they would hardly be called "mountains"; yet they have for ages formed a large part of the boundary between Europe and Asia, dividing Russia and Siberia. The Urals are for the most part a series of table-lands, extending like a huge caterpillar in a nearly north and south direction from the Arctic Circle almost to the Caspian Sea, a distance of about 1,500 miles. The peaks

stand like "isolated tents," rarely above 5,000 feet high, and averaging less than 1,500.

As far back as the 9th century the Urals were known among the Greeks for their great mineral wealth. They contain almost every rock and metal that men prize as rare and beautiful. They supply a large part of the world's platinum; they are rich in gold, iridium, copper, silver, mercury, zinc, and numerous other ores, and in addition iron and coal are found in very large quantities. Add to this their list of precious stones—sapphires, emeralds, beryls, topaz, amethysts, and many others—and an account of the Ural products reads like a tale from "The Arabian Nights'.

For the greater part the plateaus and ridges are covered with forests, spreading out to a width of nearly 200 miles; but in the north the chain appears only as a narrow treeless ridge, and in the south it divides into a western and southern outrunner, the latter called the Mugodzhar Mountains.

URANUS. Far back in the beginning of things, so the imaginative Greeks believed, there was no sky and no earth, no men and no gods. All was chaos—immeasurable empty space. But gradually things began to take form. First appeared Sky and Earth, whom the Greeks called Uranus and Gaea.

Sky, the first ruler of the world, took Earth to wife, and they had many children. Among them were 12 huge Titans, three terrible brothers called "Cyclops" who had only one eye apiece, and three giant "Hundred-handers"—Briareus and his two brothers, with their hundred hands and fifty heads. Now the hideous Cyclops and Hundred-handers were hateful to their father, as they well might be, so he thrust them into Tartarus, the vast abyss below the earth. But indignant Mother Earth called on the Titans to rise against their father, and Kronos, craftiest of them all, made himself ruler in his father's stead.

The new lord of heaven and earth then married his Titan sister Rhea, and she bore him six children—the six chief divinities of the Greek mythology: Zeus, Hades, Poseidon, Hera, Hestia, and Demeter. Hearing that one of his children would dethrone him, as he had dethroned his father, Kronos swallowed each of them at birth, except the last, Zeus (Jupiter). Him Rhea saved by giving Kronos a stone wrapped in swaddling clothes instead of the child. When Zeus grew up, he forced his father to disgorge unharmed the children he had swallowed. With his brothers and sisters he overthrew Kronos and the other Titans, and himself became ruler of the universe. In later times Kronos was identified by the Romans with their god Saturn (see Saturn).

In astronomy Uranus is the seventh planet in the order of distance from the sun. It was discovered by the elder Herschel in 1781. Uranus has four satellites or moons revolving about it. (See Astronomy; Planets.)

URBAN, POPES. Of the eight popes who have borne this name, **URBAN I** (pope 222–230) belongs to the period before the official toleration of Christianity by the Roman Empire.

URBAN II (pope 1088–1099) was a monk of Cluny, in France, and was called to Rome by the great Gregory VII, whom he followed in the papal chair after a three years' interval. He too was a great reforming pope, attacking simony, lay investiture, and clerical marriage; but he is chiefly remembered because of his part in calling the First Crusade (see Crusades).

URBAN III (1185–1187), and **URBAN IV** (1261–1264) need only passing mention. **URBAN V** (pope 1362–1370) was a French pope during the period known as the Babylonian captivity. In 1367 he resolved to return the seat of the papacy from Avignon (on the River Rhone) to Rome; but he found Rome in such a ruined condition as the result of more than 60 years' absence of the popes that he returned to Avignon, where he soon died.

URBAN VI (pope 1378–1389) succeeded Gregory XI, who also had brought the papacy back to Rome and died there. Urban was elected pope while a Roman mob was howling about the place of conclave, threatening the cardinals if they did not give them "a Roman or at least an Italian pope." Cardinals who disliked the harshness of character which Urban unexpectedly showed seized upon this pretext to declare the election invalid and elect an anti-pope, Clement VII, who set up his court at Avignon. Thus began the Great Schism (1378–1417), in which half of western Europe adhered to Urban and his successors at Rome, and the other half to Clement VII and his successors at Avignon.

URBAN VII (pope 1590) died 12 days after his election and was never consecrated. **URBAN VIII** (pope 1623–1644) was on the whole vigorous and enlightened. To him Rome was indebted for many public works. He founded the College of the Propaganda.

URUGUAY. Although Uruguay is the smallest of the South American republics, it is one of the most prosperous and progressive. Its rich, well-watered soil, its temperate climate, its position on the great trade gateway of the Plata estuary, and its predominantly white population have combined to give it a high rank in the South American family of nations.

Land, People, and Climate

On a map, Uruguay looks like a generous piece of pie cut from the southeastern coast of South America, with its point to the northwest. Along the upper side of the pie slice (450 miles long), the country has a common boundary with Brazil. On the opposite side the Uruguay and Plata rivers separate it from Argentina. The curving edge of the pie lies along the Plata estuary and the Atlantic Ocean. The area of 72,153 square miles, though small for a South American country, is larger than that of all New England. The population is about 2,100,000, giving Uruguay an average population density of 29 people to the square mile, much greater than the density of any other South American republic. Montevideo, the capital, chief port, and center of trade and culture, alone claims almost a third of the population (see Montevideo).

Uruguay's economic progress results chiefly from the country's fertile soil and splendid climate. Aside from the sandy coast and a few barren hilltops in the north, most of the country is a rich, grassy plain, sloping gently toward the west and southwest. In the north, near Brazil, the plain is broken by fertile valleys and low, wooded mountains, none of which exceed 2,000 feet. Though the Rio Negro is the only large river traversing the country, a network of about 500 small rivers and streams provides excellent drainage.

With its long seacoast open to warm moist trade winds from the Atlantic, Uruguay has perhaps the most healthful and pleasant climate of all the South American countries. Being in the southern hemisphere, it has its winter when the United States is having summer. In June, the coolest month, the temperature averages about 50° F.; in January, the warmest month, it is usually about 74°. In summertime thousands of people from Brazil and Argentina flock to the fashionable beach resorts along the Uruguayan coast. Snow almost never falls in any part of the country, and the rainfall, which is well distributed throughout the year, averages about 40 inches annually.

Ranches, Farms, Factories, Transportation

The abundance of rich, natural pasture land, the temperate climate, and the excellent water supply make Uruguay an ideal country for raising stock. About 38½ million acres, or more than nine-tenths of the arable land, are devoted to raising sheep and cattle. The country is one of the leading meat producers of the world. Animal products, chiefly wool, meat, and hides, make up the greatest part of its large export trade. England, the United States, and Germany are the chief customers.

Less than 10 per cent of the arable land is cultivated, most of it south of the 34th parallel. Wheat is the principal crop, and there are smaller yields of corn, linseed, oats, and barley. In the north are extensive groves of lemons, oranges, and other fruits. The chief drawbacks to agriculture are periodic droughts and the locust pest. The land also contains some minerals—gold, silver, lead, marble, and granite—but production is small.

Manufacturing is largely devoted to the processing of foodstuffs. The largest plants are the great *frigoríficos*, or packing houses, many of which are owned by British and American firms. The government is

helping to expand domestic production of textiles, flour, cement, shoes, and other commodities. These industries, as well as those connected with stock raising, are almost all in Montevideo, where the large population provides a ready market. Industrial development is hindered, however, by the lack of important deposits of iron, coal, and petroleum. These minerals, with sugar and manufactured goods such as machinery and textiles, are the chief imports. There are hydroelectric plants on Rio Negro and elsewhere, but the gently rolling country does not provide any great resources for water power.

Both agriculture and industry have been aided by Uruguay's splendid system of communications. There are about 700 miles of navigable rivers, of which the Plata and the Uruguay, both open to ocean-going vessels, supply more than 500 miles. Montevideo, a fine natural harbor with excellent docking facilities, handles most of the country's export trade. Spreading fanwise from Montevideo, there are some 2,000 miles of railways, mostly British-owned, and also a system of roads that is among the best on the

continent. The mileage, in proportion to Uruguay's area, is greater than that of any other South American country. Air service links Montevideo with other Latin American and European centers.

The People and Their Reforms

About 90 per cent of the people of Uruguay are whites of European descent. There are few Negroes and the Indians living in the country at the time of its discovery by the white man have practically disappeared. The language is Spanish. During the 19th century, Uruguay, like Argentina, was flooded with immigrants from Europe, chiefly Italians and Spanish, with a scattering from England and most other European countries. Today the rate of immigration is low and 70 per cent of the population are of native birth.

Because of its favorable geographic position and the progressive character of its people, Uruguay enjoys greater cultural advantages than some of its larger neighbors. Primary education is compulsory, and only 20 per cent of the population is reckoned as illiterate. Uruguay has pioneered in the field of social legislation. The eight-hour working day, old age pensions, secret and universal suffrage, and a minimum wage are guaranteed as constitutional rights. Although the majority of the people are Catholic, there



One of Uruguay's chief assets is its position on that great gateway of commerce, the Plata River. Notice that most of the larger cities are on the coast or on the navigable rivers.

is no state religion and people are free to worship as they please. The standard of living is generally recognized to be one of the highest in Latin America.

History and Government

Uruguay was discovered in 1516 by a Spaniard, Captain Juan Díaz de Solís. During its entire colonial history, it was claimed by both the Spaniards in La Plata (Argentina) and the Portuguese in Brazil. The long struggle for domination ended in 1828, and in 1830 Uruguay was proclaimed an independent republic. Thus it became a buffer state between its two large neighbors. For almost a century thereafter, the country's development was hampered by wars and internal dissension. From 1843 to 1852 Uruguay fought for its life against Argentina; and between 1865 and 1870 it was the ally of Brazil and Argentina in a war against Paraguay. Bitter rivalry between the republic's two political parties, the *Colorados* and the *Blancos* (Reds and Whites), resulted in frequent military uprisings. Not until 1904, after José

Batlle y Ordóñez, the country's great social reformer, had been elected president, did the country begin its rapid social and economic development. But because the nation's prosperity depends largely on its foreign trade, it was hard hit by the world depression of 1929. When civil war threatened, President Gabriel Terra assumed dictatorial power and in 1934 succeeded in having a new constitution adopted. In 1938 the country returned to democratic rule.

The constitution of 1934, revised in 1942, provides for a president elected directly by the people for a four-year term and for a legislative assembly of two houses. The House of Representatives has 99 members and the Senate 30 members. The members of both houses are elected by a system of proportional representation. The president chooses his own cabinet. The government conducts various commercial enterprises, such as banks and manufacturing plants, that are considered of national importance. (For further study of geography and culture, see South America; Latin America; Latin American Literature.)

The "SALT LAKE" STATE and Its RICH DOWRY



A Fertile Utah Valley in the Shadow of Snow-Clad Peaks

UTAH. The "Salt Lake State" not only contains the most mysterious body of water in the New World, but has many other sources of never-ending interest and wonder. Mountains which shut out the moisture-bearing winds but accumulate melting snow

on their crowns and sides are piled up to a height of from 10,000 to 13,500 feet. Mighty rivers pouring through countless canyons send cataracts and cascades leaping and foaming down a thousand dizzy precipiced channels. With an area as large as all New England combined with Maryland and Delaware, Utah has

Extent.—North to south, 342 miles; east to west, 276 miles. Area, 84,916 square miles (of which 2,570 are water). Population (1940 census), 550,310.

Natural Features.—Wasatch Mountains stretching south from northern boundary; Colorado Plateau to the east crossed by Uinta and lesser mountain ranges (highest point, Kings Peak, 13,498 feet); to the west the Great Basin containing Great Salt Lake and Great Salt Lake Desert. Principal rivers: Bear, Weber, and Jordan flowing into Great Salt Lake; Sevier emptying into Lake Sevier; Colorado and its tributaries, the Green and San Juan. Mean annual temperature, 48°; mean annual precipitation, 13".

Products.—Hay, wheat, sugar beets, potatoes, alfalfa seed; sheep and wool, cattle and dairy products, poultry and eggs; copper, lead, coal, silver, gold, zinc, iron, gypsum, asphalt; lead smelting, sugar refining, flour and other mill products, meat packing.

Cities.—Salt Lake City (capital, 122,944), Ogden (43,688), Provo (18,071), Logan (11,868).

room for parks larger than whole eastern states, in which nature has built mammoth stone bridges and huge statues of unnamed monsters—master works worthy to be classed with the wonders of the world. There are irrigated valleys with orchards and gardens,

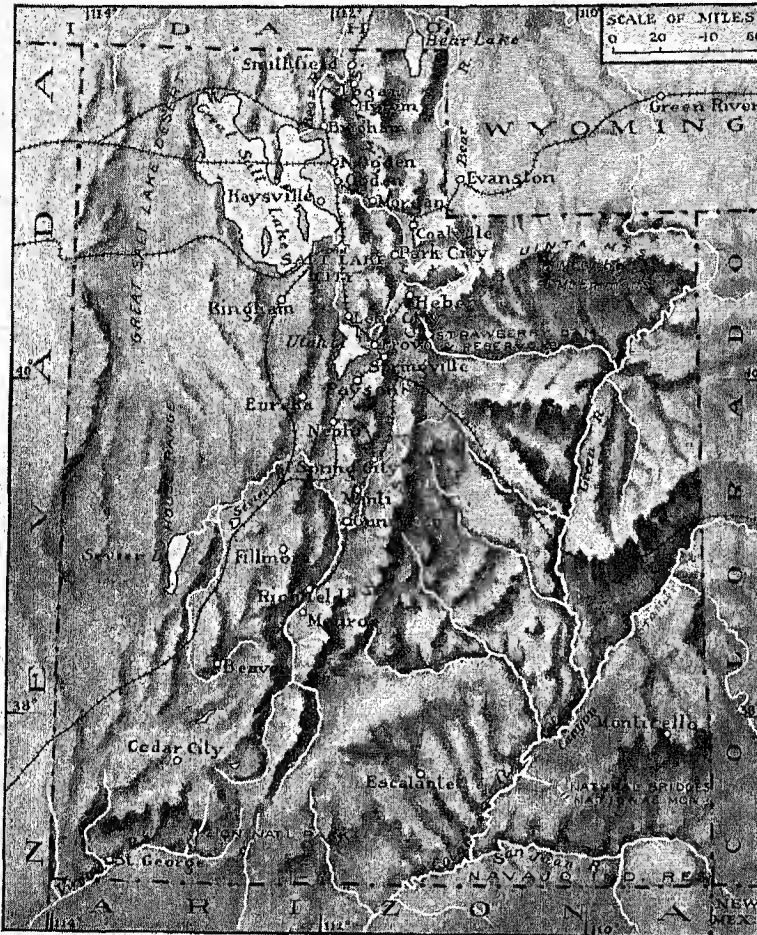
vineyards and grainfields, as well as burning, cactus-covered deserts; and the whole great state is underlaid with gold and silver, coal, lead and copper, and nearly every other metal and mineral in human use.

The men whom conquest of gold lured into Utah's desert never dreamed what its barren lands could

produce. Where no water is, the soil presents a desolate picture of greasewood and cactus as in the Great Salt Lake Desert, a part of the Great Basin that stretches across the West toward the Sierra Nevadas. Turn on the water, and a garden blooms. The soils are among the most productive in the United States, made rich by thick deposits of an ancient sea (Lake Bonneville), which in the glacier period covered the

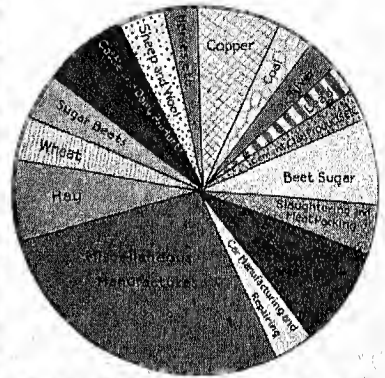
through tunnels in the Wasatch Mountains. The completing of this project in 1916 made many thousand additional acres of the valley fruitful.

Only about one-tenth of Utah is under cultivation, but many fruits, flowers, and vegetables are grown in large quantities from small areas. In the extreme north the harder grains, vegetables, and fruits are raised, and in the south cotton, almonds, figs, wal-



THE RUGGED STATE OF UTAH

The map shows Utah's great mountain backbone, splitting the state in two. Below we see the relative value of Utah's products, and the proportion of its people engaged in various occupations.



AGRICULTURE

MANUFACTURING

TRADE AND TRANSPORTATION

MINING

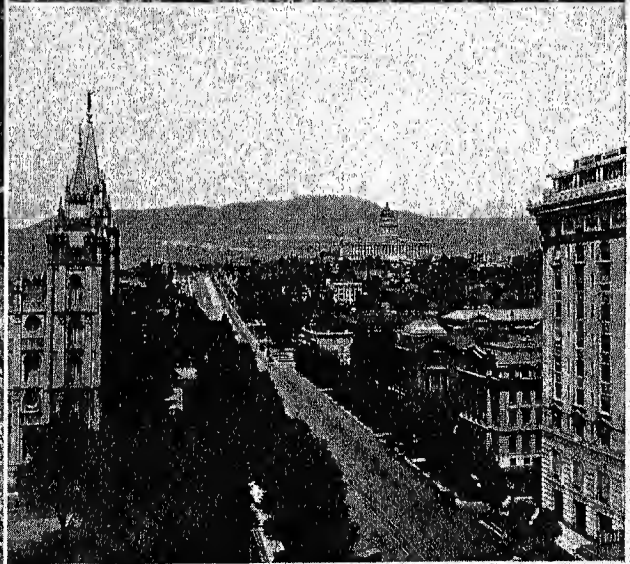
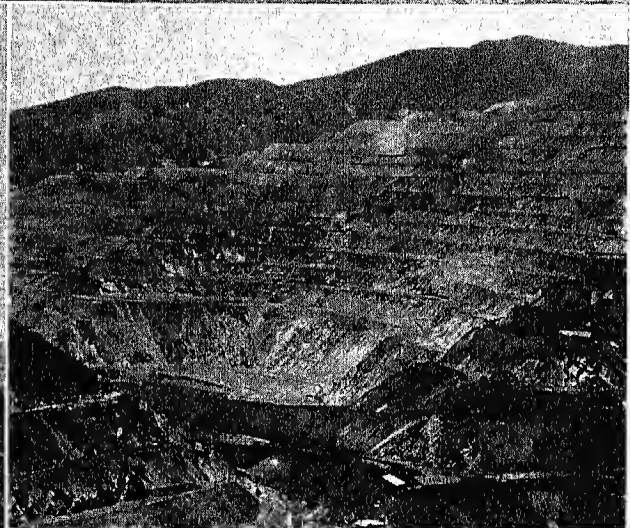
OTHER OCCUPATIONS

western half of the state. Brigham Young, who in 1847 led his little band of Mormon followers to the Utah valley, saw the possibilities of agriculture. "We cannot eat gold and silver," he told the people, and urged them to devote themselves to farming. To these early settlers we owe the first irrigation canals of the United States. Wherever a stream flashed into the sunshine from the gloomy mountain gorges it was caught and trailed into a thousand little rills upon the thirsty land. Since that time many millions of dollars have been spent for collecting the water in great reservoirs and distributing it scientifically wherever and whenever it is needed. At enormous expense the Strawberry River, which flowed east into the Green River and thence into the Gulf of California, was caught in a great reservoir and made to flow west

nuts, pomegranates, and grapes are grown to some extent. Between these two are all the crops common to the temperate zone, the most important being wheat, oats, potatoes, hay, sugar beets, and fruit. On all of its irrigated land Utah ranks high in the yield per acre. Grasses and grains are also raised on "dry" farms where the annual rainfall is 12 inches or more, and grazing is carried on in unirrigated sections.

But the great industry of Utah thus far has been its mining. Every mountain range is a hiding place for mineral treasures, from gold to lead and coal to zinc. At Bingham, near Salt Lake City, is one of the greatest and strangest copper-producing camps of the world, where thousands of tons of ore are yielded each day without shaft or tunnel or any underground work. From a mountain of copper ore four miles around the

WHY TRAVELERS FIND UTAH A WONDERLAND



Engineering skill has simplified travel in vast Utah. At the top is the famous Lucin cutoff, a railway trestle built across the Great Salt Lake to save 44 miles between Lucin and Ogden. At the lower left is the Zion-Mount Carmel highway as it enters a tunnel, cut for more than a mile through mountains of solid rock. Utah's mineral wealth is illustrated at the right by the open-pit copper mine at Bingham Canyon. Explosives and steam shovels, used in "bench-mining," as this is called, have sculptured the mountain side into a gigantic staircase. Mountains scallop the horizon of Salt Lake City (lower right), while the State Capitol and the spires of the Mormon Temple recall a romantic history of sturdy pioneers.

base and nearly 2,000 feet in height gigantic steam shovels tear out the ore and dump it into cars that take it to the crushing mills and smelters. Silver, lead, coal, gold, and zinc are the other leading sources of mineral wealth. Because of their inaccessibility, the large deposits of iron ore in the southern part of the state were little worked until the second World War. Other mineral products include salt, gypsum, granite, and limestone.

How the Mormon Church Has Helped

In the development of the state's resources, especially in irrigation projects and in great retail stores, the organization of the Mormon church has pursued a very enlightened and far-sighted policy of encouraging coöperative enterprises. Nowhere has the energy and thrift of a whole state population been more consciously and effectively directed to the development of natural resources. Mormons themselves jokingly tell the story of the surprise of the visitor to the infernal regions who found them green and blossoming. Satan disconsolately explained that it used to be just what the visitor expected but that some Mormons had come down and at once started an irrigation project and this was the result.

In the same latitude as Virginia, Utah enjoys one of the finest climates in the country. The temperature varies considerably with altitude, and if the valleys are warm, one can always get a snowball by climbing a few miles up a mountain-side. The marvelous commingling of salt-sea and mountain air, with its highness and dryness, make the state one of the world's great natural sanitariums. There is no sea bathing anywhere which equals that of Great Salt Lake, where the water is so buoyant that it is impossible to sink in it (see Great Salt Lake).

Utah's Chief Cities

Salt Lake City, the capital, is the largest and most beautiful city in the state. The great Tabernacle and the Mormon Temple, the capitol, and the state university are the most striking buildings (see Salt Lake City). Ogden, visited by many tourists because of the picturesque Ogden Canyon at the city limits, is a large manufacturing city, containing knitting mills, beet sugar and canning factories, flour mills, packing houses, and other industries. Provo is in the center of the agricultural area.

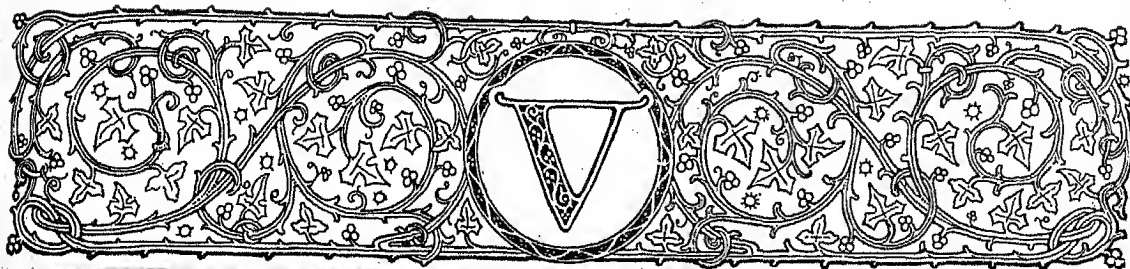
Spanish agents sent by Coronado first touched this area in 1540 and it was penetrated by occasional missionaries and travelers in the next two centuries. In 1824 James Bridger, a hunter, discovered Great Salt Lake. The territory included in Utah was part of the territory acquired by the United States in 1848 at the close of the Mexican War. The Mormons under Brigham Young had settled here in 1847. The growth of the state's population at first was confined to Mormon converts. They organized it as the State of Deseret but the United States refused admission and set up the territory of Utah in 1850. Long controversies followed between the Mormons and the government officers. The influx of gentile (non-

Mormon) settlers after the Civil War and the question of polygamy were long subjects of controversy and the latter practice delayed the admission of Utah as a state. Federal legislation against polygamy was ineffective and the friction was so great that garrisons of Federal troops were sent in from time to time. In 1890 the president of the Mormon Church issued a statement that it no longer approved polygamy. In November 1895, a constitution was adopted and the state was admitted to the Union in January 1896.

UTRECHT (*ù'trèkt*), NETHERLANDS. This quaint old Dutch city, famous for its historic memories, has stood for many centuries at the point where the Rhine River divides into two branches, the one known as the Old Rhine, and the other as the Vecht. The Romans called it *Trajectum ad Rhenum*, or "ford of the Rhine," and its present name *Oude Trecht* or Utrecht means "old ford." Here St. Willibrod, the English apostle to the Frisians, founded a bishopric about 700 A.D., about which the city grew. In 1579 the seven northern provinces of the Spanish Netherlands—the future Dutch republic—joined in the Union of Utrecht to make good their revolt against the political and religious tyranny of Spain; and here in 1713 was signed the famous Treaty of Utrecht, which terminated the War of the Spanish Succession and gave the southern Netherlands (Belgium) to Austria, and Nova Scotia, Newfoundland, and Gibraltar to Great Britain.

In the center of the town stands the old "Dom" or cathedral, begun in the 13th century, which occupies the site of the church formed by St. Willibrod. This was one of the finest and largest churches in Holland, but in 1674 a hurricane blew down the nave, and it was never rebuilt, so today an open space separates the solitary western tower from the choir and transept. From the tower, with its chime of 42 bells, one gets a good view of the broad green pastures dotted with herds of black and white cattle, and of almost the whole of Holland, including Amsterdam, 22 miles to the northwest. Graceful Gothic cloisters connect the cathedral with the University, one of the most famous in the Netherlands. Among other buildings of historic interest is the "Pope's house," built in 1517 by the future Pope Adrian VI, the only man of Dutch birth to hold this office.

Utrecht is traversed by two canals, spanned by over 90 bridges. The roadways lie high above the surface of the canals, which are reached by steps, and many of the poorer people live in cellars beneath the roadways with their doors opening on the canals. The old ramparts have been converted into pleasant promenades, bounded by water courses. On the east side of the city is the famous Maliebaan, a triple boulevard, shaded by lime trees and flanked by handsome houses. Good water communications and railways make Utrecht an important center of trade, and there are manufactures of woollens, silk, velvet, carpets, carriages, organs, cigars, chemicals, machinery, etc. Population, about 150,000.



WHAT ARE YOU GOING TO DO *this VACATION?*



*Hundreds of Ideas for Fun, Adventure, and Worth-while Activities—Helps for
Planning to Get the Most Out of Your Leisure Time*

VACATION ACTIVITIES. "School is out!" Three months of freedom await every boy and girl. For one-fourth of a year there will be no classroom routine. How will boys and girls use their time for those three months? Will they spend it in idling and in restless, aimless play, or will they spend it in enjoyable and profitable activities?

With a little planning, boys and girls can fill every vacation hour with fun and adventure. Fun and adventure are what all young people want. Interesting activities are as necessary to the well-rounded development of school-age children as physical exercise is necessary to a baby's development. Psychologists and educators tell us that lack of interests is often the cause of irritability, selfish demands for attention, and mischievous impulses. As all parents know, boys and girls are happier when they have something to do.

During the school year this need is met by the varied activities of classroom and playground. For nine months, boys and girls steadily develop new skills and social relationships. Then comes the sudden break of vacation. Children are thrown on their own resources for three months. In this period, what will happen to their development? The vacation problem is summed up in the words of the National Recreation Association: "Certainly, school authorities, parents, city officials, welfare workers the country over—all who have any interest in the well-being of our boys and girls—ought to have some concern as to what happens when school releases its hold upon them for this considerable period."

An unplanned vacation is likely to be disturbing and unprofitable. With no planned activities to occupy their time, children soon exhaust their own limited



fund of ideas. After a few days, they begin to ask, "Mother, what shall I do now?" When they are "turned loose" to spend their days in aimless play, they cannot help largely wasting this precious one-fourth of a year. Nor is the loss of opportunity for continued development the only loss that children suffer when they lack planned activities. The planless vacation also frequently costs them much of the progress they made in the previous school year. Tests show that pupils may lose, in the vacation period, from three to eight school months of skill in such important subjects as arithmetic, spelling, history, and geography.

Gaining Instead of Losing

Hence teachers and informed parents recognize the need of providing activities that give children the opportunity to better themselves in things they already can do, and the opportunity to explore new fields of interest. Thus they may retain the skills they have learned, and develop many new skills. In September, they carry back to school enriched experience and sharpened minds, ready to forge steadily ahead in continued development.

No child need be denied this opportunity. By using the outline on the following pages,

VACATION is a challenge to every boy and girl. It challenges them to see if they, on their own initiative, can have a good time and do something worth while.—Elbert K. Fretwell, Professor of Education, Columbia University.

The child craves activity, engrossment of mind, and enjoyment. It is up to us to provide the opportunity to train for a good use of leisure wherever we can in life, especially at home and in school.—Dr. Henry Suzzallo, Late Director, President's National Advisory Commission on Education.

I cannot conceive of a more foolish thing than the idea of providing the youth of the land with supervised activities for six to eight hours a day for nine months, and then cutting them absolutely loose, without direction or mental stimulation of any kind, for a period of three months. Such a mental let-down destroys the mental discipline which has taken months at school to build.—Willis A. Sutton, Superintendent of Schools, Atlanta, Ga.; Past President, National Education Association.



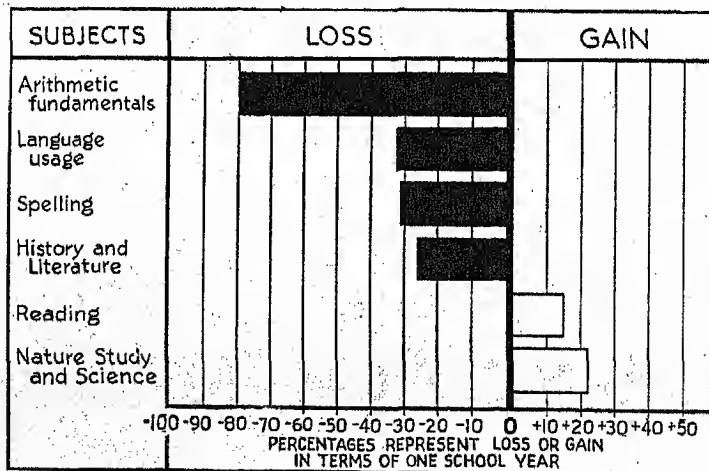
every boy and girl can find interesting vacation activities. The outline shows him how to spend his vacation with fun and profit, whether he stays at home or goes away. Whatever the activities he

chooses, they will contribute to his development. Many children, for example, need to discover the fun and value of independent effort. They are at a loss unless the "gang" is at hand to play games. They want their mothers or their friends to do almost everything for them. They are too dependent on others. Vacation gives them a superb opportunity to overcome this handicap. An excellent activity for such young people is collecting. Almost everyone can get pleasure from some form of collecting. The outline gives a wide choice of interesting objects to collect and tells how to start and care for a collection.

Creative Fun

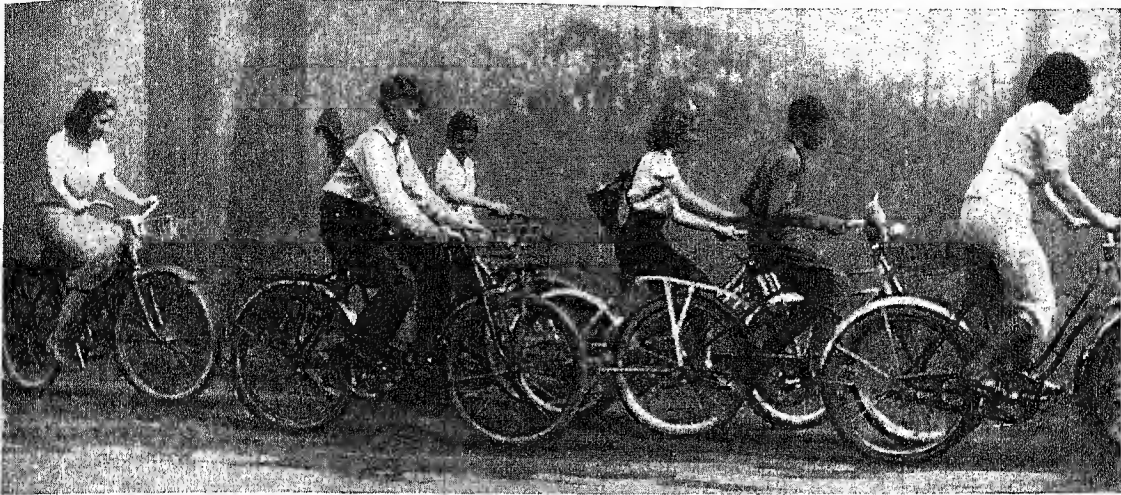
Another activity which appeals to most youngsters is giving informal entertainments. Boys and girls love to take part in shows. Such creative play is a splendid stimulus to their imagination and helps them to develop in many ways. In the land of make-believe, they lose their self-consciousness and shyness. Each participant shares in working out the difficulties that

EFFECT OF SUMMER VACATION ON ACHIEVEMENT



This graph shows strikingly how much children lose during vacation. The loss or gain is expressed in terms of the average amount of a school year above or below norm. The scores are the average difference in achievement of fifth- and sixth-grade pupils in the University Training School, University of California, Los Angeles, before and after summer vacation. Note the gains in reading and science, resulting from the fact that these children read for fun and took part in activities that involved natural science. On the other hand, note the great loss in subjects not usually involved in vacation activities. When suitable activities are planned, vacation can be made to yield rich results.

FOLLOWING THE BICYCLE TRAIL TO ADVENTURE



With the whir of wheels singing a merry tune, bicycle cruises into the woods or country are full of fun and exploration. And how good a lunch tastes when you eat it beside a winding brook or in the cool shade of spreading trees!

arise and learns to work with others in the spirit of partnership. The outline suggests how children can easily put on a magic show, circus, and puppet show.

Sports and Outdoor Interests

Many boys and girls need to be encouraged to spend more time out of doors and to develop physical skill. In the outline there is such a wide range of sports and outdoor interests that everyone will find something to his liking. Simple but important suggestions encourage young people to undertake such helpful activity, and show them how to carry on with it. Camping, for example, has a universal appeal. This is one of the most valuable of all vacation adventures, yet few are able to take camping trips away from home. To enable all to enjoy this important experience in self-reliance, an entire section of the outline is devoted to

"back-yard camping." By following the simple suggestions, every boy and girl can "camp" without leaving home.

One of the commonest problems of parents is to teach their children the value of money. Another problem, even more vital in character-building, is to teach them to do a job well, whether they are paid for the work or not. Both these problems are met in the outline. In

the section headed "Discovering the Value of Vacation Jobs" are suggestions on how to do jobs well.

Travel for the Stay-at-Homes

No activity, perhaps, offers more opportunity for enjoyment and enriching experience than travel. The vacation period makes that activity possible for every child—even for those who never leave home. One section of the outline is devoted to "Trips to Take." For children who are staying at home, there are many suggestions on how to explore in the section "Tours Around Your Town." It tells them where to go and how to arrange each trip. Still another travel opportunity for those who stay at home is imaginary travel. By following the suggestions for "Magic Carpet Trips," boys and girls may tour the wide world, discovering something new every minute. For those who are going away, there are suggestions on how to get the most out of trips away from home. With proper planning, trips add invaluable contributions to the child's knowledge. He knows what to look for and understands the meaning of what he sees.

But to get an idea of the numerous and varied opportunities that await boys and girls this vacation, you must glance through the following out-



By practise like this, everyone can learn the important tennis strokes.



Just one look at that grin tells you how much fun you have with archery.

line. For those already mentioned are only a few of the many activities it suggests. The wide range of these activities assures every youngster a vacation that will

not only be rich in fun and adventure, but will also develop his abilities, lead him out into new fields of interest, and permanently enrich his life.

Three Months of Fun and Adventure

—SUGGESTIONS FOR THINGS TO DO—

EACH day of vacation is full of things to do! All around you are new things to see. And when you know how to use your time, what to do, you can pack your days full with fun and worth-while discovery. In the guide below, you will find suggestions for adventures for every single day. They are all things you can do yourself.

I. SUMMER SPORTS FOR BOYS AND GIRLS: The true sportsman, even if he is not skilled enough to be a champion, is admired and liked by all who know him. Every boy and girl can learn one or more sports. How often you have watched a player, and said, "I wish I could do that, but I could never learn." But you can! Many sports are easier to learn than they seem. All that you need is to know the rules and to practise. Vacation days and your leisure hours give you opportunity to discover the fun of learning a new sport, or to get more pleasure and satisfaction from an old favorite by improving yourself in it—smoothing out your swimming stroke or discovering how to place your tennis shots. The following guide tells you how to play various sports and how champions play them. But first read the article on Athletics and the companion article on The Honor of the Playing Field: A-355-7.

A. Archery: A-254-5. Robin Hood's sport develops a quick eye and a steady hand. This ancient sport of warriors is more popular today than ever before, for both boys and girls. You can set up a target in your basement or back yard, and work out tournaments with your friends. Championship tournaments are held throughout the United States.

- a. How to Make a Bow and Arrow: A-254.
- b. How a Champion Shoots: A-255 picture.

B. Baseball: Every boy and girl can learn to play baseball. In this favorite American game, neither size nor strength is so important as the skill that almost anyone can develop by practise.

- a. Making a Baseball Diamond: B-54.
- b. How to Play Baseball: B-56-7.

- c. Secret of Curve Ball; Knuckle Ball: B-55.
- d. Teamwork Puts Over Strategy Plays: B-56b.
- e. How to Read a Box Score: B-56b.
- f. Great Baseball Stars: B-56, 56a, 56b.
- g. Making Baseball a Career: B-54.

C. Softball: More people—men, women, boys, and girls—play this than any other team game. Softball can be played on the playground or in your back yard. It is as easy to learn as it is fun to play.

- How to Play Soft Ball: B-57.

D. Basketball: A fast game that develops teamwork. For a basket, just fasten a barrel hoop, at the right height, to a post or shed door. Dodging and "dribbling" down the yard will speed up your footwork.

- a. Height of Basket: B-60.
- b. How to Shoot Baskets, Guard, Pass, and Dribble: B-61 pictures.
- c. Special Rules for Girls: B-62.

E. Boating: Row boats and sail boats are constantly growing more popular. Rowing is a fine exercise, and sailing challenges your skill every minute. Yet both sports are easy to learn.

- a. How to Row a Boat: B-163.
- b. How to Sail a Boat: B-164, 165 picture.

F. Canoeing: If you can paddle a canoe with skill you are sure of an exciting summer, for this fleet Indian craft skims over the water like an arrow. By observing a few simple rules, you can easily learn to handle a canoe. Do not, however, paddle or ride in a canoe until you know how to swim 75 yards.

- a. How to Get into a Canoe: C-75.
- b. How to Steer a Canoe: C-76 pictures.

G. Boxing: A boy who can box can usually take care of himself. And any boy who will practise can learn. You do not have to be large or strong, because it is skill and the ability to keep your temper that count in boxing. Many a small boxer has won over a larger, unskilled opponent.

- a. Simple Rules of Boxing: B-208.
- b. Boxing Stance and Blows: B-208, B-209 pictures.
- c. Champions of the World: B-210a-b.

LEARNING TO SWIM IS EASY AND GREAT FUN



These lads watching their older friend are rapidly learning the crawl. Young people learn quickly when they know the fundamentals and have studied the strokes. Knowing how to swim not only brings fun and health, but safety as well.

TONIGHT WE ARE GOING TO CAMP OUT



With their lean-to tent set up for the night, these lads are eagerly planning the supper they will cook over their own camp fire. This camping out is an adventure and an experience in self-reliance that they will long remember. Practically every boy and girl can have the fun of camping just by setting up a homemade tent in the back yard, and learning how to live out of doors.

- H. Fencing:** Fencing, often called the "king of sports," is becoming ever more popular with both boys and girls. It is worth while to buy the proper equipment at the start, because once you begin to fence you will probably keep it up for years.
- a. Equipment for Fencing: F-24.
 - b. How to Hold the Foil: F-24.
 - c. Thrusts and Parries: F-23 picture.
- I. Football:** When you know the rules, football is one of the most thrilling of all games to play or watch. The rules are not difficult to learn. Many stars practise kicking and passing all summer. To perfect your aim in kicking, mark circles with string or barrel hoops in different parts of the yard. For place- and drop-kicking, set a cross bar at the right height. For passing, hang small barrel hoops from trees or posts and practise passing the ball through.
- a. "The Million-Dollar Game": F-148.
 - b. Important Rules: F-150-1.
 - c. How to Kick and Pass: F-151b picture.
 - d. Six-Man and Touch Football: F-151d-152.
 - e. Strategy of Great Coaches: F-151c-d.
- J. Swimming:** So important is swimming that many schools compel pupils to learn it before graduation. Learning to swim is the simplest thing in the world when you got the right start. Many boys and girls learn to swim so well that they are champions in their "teens."
- a. Easy Way to Learn to Swim: S-345.
 - b. How Experts Swim: S-347 pictures.
 - c. How to Play Water Polo: P-297.
- K. Tennis:** This lively game is played in practically every country of the world. International teams compete annually for the famed Davis Cup. The earlier you learn tennis, the more skill you will gain. You can easily set up a net in your yard, and practise the important strokes.
- a. How to Play Tennis: T-49-50.
 - b. How Champions Play: T-51 pictures.
- L. Wrestling.** In every country, this is a favorite sport. By learning the correct "holds," a boy can often put down a larger, unskilled opponent.
- a. Why Wrestling Is Important: W-181.
 - b. How to Get "Holds": W-182-3 and pictures.
- II. HOW TO GO CAMPING: C-42.** Every boy and girl can learn the secrets of camping. If you follow certain rules you will find it easy to live outdoors. The camp lore references listed below tell you how to get ready for camping and how to be a good camper.
- A. Where to Go Camping: C-42. Government maps are available, showing the camp sites near your home.
 - B. How to Choose a Camp Site: C-43. This tells what to look for and what to avoid.
 - C. What to Take: C-44. All your equipment is listed here for you—clothes, bedding, cooking utensils—as well as directions for packing your food. You can make much of this equipment at home.
 - D. Tents for Long and Short Trips: C-45. These suggestions and explanatory pictures show how anyone can learn to put up a tent.
 - E. How to Handle and Use Knife and Ax: C-46. Here you discover how to split firewood, make tent stakes, and fell trees.
 - F. How to Make Various Camp Fires: C-47. Here are the secrets of the best firewoods, and of the best ways to lay cooking and camp fires.
 - G. Safety Rules for Good Camping: C-47b. Good campers should know these rules.
 - H. "Back-Yard Camping": If you cannot go away for a camping trip, you can enjoy most of the fun of camping right in your own back yard. And you can learn the pleasure of doing things for yourself. You can make your own tent and put it up. By following the suggestions in the Camping article, you can make much of your own equipment. You can learn to use a knife and perhaps an ax. You can acquire the knack of firebuilding, and practise cooking your own food. When you are skilled enough, you may want to invite your mother and father to a dinner that you cook over your own camp fire. Some nights, perhaps, when the weather is clear, you will want to sleep outdoors under the stars all night. Always keep your camp as neat and shipshape as though you were out in the woods. And at all times remember that a good camper is careful of both his own and other people's property. If you learn camp lore well, you will find that your "back-yard camp" is a real adventure in good camping.

CIRCUS DAY IN YOUR OWN BACK YARD



A collection of neighborhood toy animals plus dressed-up pets makes a grand "side show" for your back-yard circus. In nearly every home there are enough boxes, cardboard, and old sheets to make the barred cages and curtains.

III. SHOWS TO PUT ON: Just imagine having your own circus or magic show! And you can have them. In the guide below, you will see many things to do and just how to do them.

A. "Back-Yard" Circus: You can have "The Biggest Show on Earth" right in your own back yard or in a corner of the neighborhood playground. With a kazoo band or a comb band playing the entrance march, your ringmaster is ready to announce the first "amazing feat of super-human daring." This "stupendous spectacle of the impossible" may be clowns, their clothes worn backward, running a three-legged race between pans of water. You can make up many other stunts from the suggestions in the guide below.

- a. How Ringling Brothers Started: C-237c. Four boys built their show into a giant business.
- b. Behind the Scenes at a Circus: C-237d. Here we see the show getting ready for summer.
- c. Words Circus Men Use: C-237e. "The Big Top" has its own language.
- d. What Circus Animals Do: C-237f. Elephants can test bridges and move railway cars.
- e. How Circus Performers Live: C-237g-h and pictures. In large shows, 6,000 meals a day are served.

B. Stunts for Your Back-Yard Circus: Costumes for clowns, acrobats, strong men, bareback riders, gymnasts, and for the various "wild animals" are easily made from old clothes, bright colored shawls, scarfs, sweaters, bathing suits, and odds and ends from your mother's serap bag. Bright-colored costumes make your circus lively. A false mustache, cane, and black paper "silk" hat give your ringmaster a professional air.

- a. Strong Man Act: Two balloons painted black, attached one to each end of a black-painted broomstick, make impressive heavy "weights" for lifting, especially if you paint "500 pounds" in white on each balloon. Your strong man, of course, should pretend to have great difficulty lifting them.
- b. Bicycle Acrobatics: Decorate your bicycles with paper streamers. Riders will pick up handkerchiefs or hats from the ground while riding. Another stunt is for riders to pedal two or three abreast around the ring without using handlebars, each holding a long colored streamer in each hand.

c. Trick Dog: Train your dog to high-jump over a stick, and roll a barrel with his forepaws. When training him, have him wear the costume he will wear in the circus so that he will get used to working in costume.

d. "Wild-Animal Training": A costumed boy or girl makes a ferocious lion that can snarl magnificently. Cracking his whip, the trainer makes the lion sit up on a chair, jump over a barrel, and roll a hoop with his hind paws. Another player in costume makes a fino trained seal. It balances a ball on its nose and head and tries to catch in its mouth a piece of bread thrown by the trainer.

e. "Chariot Race": Your horses may be costumed boys on their hands and knees. The drivers may be girls in Roman costume, holding reins of colored ribbons or string. The horses must stay on hauds and knees as the girls drive them at a gallop twice around the ring.

f. "Stupendous, Colossal High Dive": At the grand announcement that a daring diver will plunge from the platform into a pan of shallow water, the "diver" climbs to the platform. Under his swimming suit he has hidden a rag doll. While the kazoo band plays a stirring march, the "diver" lets the doll dive.

C. Magician Show: Wonders of magic are based on a few important secrets that every boy and girl can learn—

GOOD DOG AND PROUD MASTER



Everyone admires a well-trained and well-behaved dog. And all boys and girls can train their pets by learning a few rules.

secrets that great magicians use in putting on tricks. Practise will help you to mystify your audience.

- a. Three Things a Magician Needs: M-32b.
 - b. How to Make the Hand Quicker Than the Eye: M-32b. Magicians call this "psychology of deception."
 - c. How Simple Timing Puts Over Tricks: M-32b-c. The secret of disappearing coins.
 - d. Motions in Sleight-of-Hand: M-32c. Master performers move slowly, smoothly.
 - e. Secrets of Showmanship: M-32c-d. Tells how to interest your audience.
 - f. Equipment of the Magician: M-32d.
- D. Puppet Shows: For centuries, puppet shows have been a favorite entertainment in many lands. Today, both boys and girls are discovering the fun of giving their own puppet shows. Everyone likes to see the gay little actors move about on the stage like tiny real people. You can have knights or Punch and Judy or Indians or aviators or fairy tale princes, or any character that you want "come to life." You can easily give puppet shows by following the suggestions in the guide below.
- a. Famous Puppet Characters: P-368b-c. These will suggest ideas for your own puppet show.
 - b. How to Make Puppets: P-368c. You can make these little actors from a number of different materials.
 - c. How to Work Marionettes: P-368c-d. You can use as few as three strings.
 - d. How to Build a Puppet Stage: P-368d. A chair or clotheshorse does wonders.
 - e. Books About Puppets and Marionettes: H-313n. These are rich in ideas for plays and costumes and stage settings.

IV. SECRETS OF SIGNALING: This art of sending information quickly over distances is easy to learn. You can make flags, or use squares of colored cardboard. To stiffen the flags so that they will stand out clearly, wire the edges.

- A. Code for 2-Flag Semaphore Signals: S-142 picture. Often used on ships at sea.
- B. Importance of Signaling: S-143. The army and navy give special training.
- C. How Telegraph Codes Work: T-30. By tapping the end of a pencil on a wooden block, you can practise the famous Morse code or International code. Faithful practise will develop your sending speed.
 - a. How "Dots" and "Dashes" Make Words: T-30. Here are the alphabets used in both codes. The "dot" is the very short line, and the "dash" is the longer. For a dot, you tap your pencil very quickly. Hold the tap longer for a dash.
 - b. Sending Speed of Fast Operators: T-32. If you and a friend learn together, you can time each other to see how fast and accurate you become. If you learn alone, time yourself by a clock. To learn receiving you will have to work with a friend.

V. PETS AND HOW TO TAKE CARE OF THEM: To have the most fun with your pet, you must know how to treat him well. This will keep him in good health and friendly spirits. Some boys and girls make a little business of raising healthy, well-cared-for pets, and selling them to neighbors or through newspaper advertisements. If you sell pets, give a list of instructions to the buyer, telling him how to feed and care for the pet.

- A. What You Should Know about Pets: P-153-6. You will find other important information in the articles on individual animals, such as Cat, Dog.
- B. How to Train Your Dog: D-85. Young dogs and many older ones can be trained so that you will be proud of them. The number of things that your dog learns depends entirely on you. Each lesson is a challenge to your patience.

YOUR OWN PUPPET THEATER



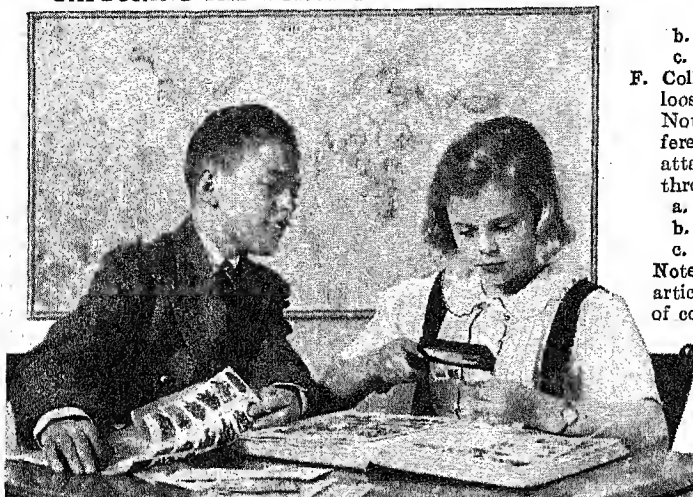
You can easily make a puppet theater in the basement, garage, or attic. For a stage, use a kitchen table, reinforced card table, or strong boxes. Make your stage curtain from a sheet or old drapery. Painted cardboard is a fine backdrop.

But if you stick to it and work gently with your dog, you will be surprised at the number of tricks he can learn within a few weeks.

- a. How to Housebreak and Train a Puppy: D-85. Begin training as soon as you get a dog.
- b. Easy Ways to Make Your Dog Mind You: D-85. He soon learns the meaning of certain words.

VI. COLLECTOR'S TREASURE HUNT: Many famous men and women make collecting their chief hobby. Usually these collectors start in a small way, just as any boy or girl can do. There is a great variety of things to collect, and you will find a number of suggestions in the guide below. Keeping your collection in order adds to the fun. Sort and label your specimens as fast as you get them. A well-kept collection, neatly housed in scrap-

EXPLORING THE WORLD THROUGH STAMPS



It is easy and lots of fun to build up a stamp collection, once you get the right start. Friends and neighbors will give you stamps and you can get foreign stamps by writing to schools in other countries.

books or boxes and lettered with neat printing, makes a fine exhibit to show your friends and family. If you start a Collectors' Club in your neighborhood, you can add treasures to your collection by trading specimens.

- A. Stamp Collecting: This is one of the most popular of all hobbies. To add to the fun, make a "stamp trail." That is, every time you get a new stamp, read about the country from which it came. Thus you will explore many lands and discover famous heroes who appear on stamps.

- a. Pictures of Rare Stamps: S-267.

- b. How to Begin a Stamp Collection: S-269.

- B. Coin Collecting: Be on the watch for small coins of different dates. Try to get one for each year. You will be amazed to find how old some pennies, nickels, and dimes are. Mount your specimens on cards. Then, in the articles United States History and the various Presidents, read what happened in the year each of your coins was minted. Under each coin, print the name of the president then in office and one or two chief events of the year. This makes a splendid and informative collection that will interest everyone.

- a. Ancient Money: M-220. Many different articles have served as money. Some people used rice; others used feathers.

- b. How Coins Were Invented: M-220.

- c. Strange Coins of Long Ago: M-220a pictures.

- C. Collecting Leaves: This makes one of the most surprising collections, for each kind of plant has a different sort of leaf, especially shaped for the conditions under which the plant lives: T-135-6, 139.

- a. How to Collect Leaves: L-89.

- b. How Leaves Eat and Breathe: L-88 picture.

- D. Collecting Seeds: Every plant has a trick to spread its seeds. Notice the shape of plant seeds, and see if you can tell how they are carried away from the plant. Mount specimens, and print a description of their method of spreading. For example, the prickly burdock seeds that you find in almost every field are spread by sticking to the fur of animals.

—The Many Kinds of Seeds: S-73-5, T-137-8.

- E. Hunting Plants: Did you know that plants breathe? That a plant will turn a somersault to reach the sunlight? You can learn all sorts of secrets by examining the plants right around you. Even the grass, the weeds, and the commonest garden vegetables have marvelous powers.

- a. Great Plant Families and How They Live: P-234-41. Mount your plants; neatly print a label for each

part; and tell where you found the plant and on what day of the month.

- b. How Plants Help Man: P-244-6.

- c. Plants That Harm Man: P-272-4.

- F. Collecting Bark: You can easily take small pieces of loosened bark without harming a tree's armor. Notice the strange formations in the barks of different trees. Mount your specimens on cardboard, attaching the bark with pins, or tying a bit of string through holes in the bark and cardboard.

- a. How to Tell Important Trees: T-133a-d.

- b. How Man Depends on Trees: T-130-32.

- c. A Year in the Forest: T-134-9.

Note: The list of "Things to Do" at the end of the article on Nature Study suggests many other kinds of collections that you can make.

VII. PHOTOGRAPHY: You do not need expensive equipment. Some of the finest photographs in exhibitions have been made with cameras that cost only a dollar or two. The secret of taking an interesting photograph is in the composition of the picture—that is, the arrangement of the things you photograph. Instead of standing directly in front of the object and snapping your picture at once, look around to see if other objects will add interest.

- A. Suggestions for Making Good Pictures: P-186. Here are important hints for beginners.

- B. Kinds of Camera: P-184.

- C. Fast and Slow Lenses: P-185. Do not always keep a fast lens "wide open."

VIII. MAKING FRIENDS WITH THE BIRDS: In city or country, you can learn the secrets of bird lore. And few animals are more important than birds, for without birds very little food would grow for us. That is why everyone should know about birds and protect them.

- A. Why a Bird Is a Flying Machine: B-120. A bird's framework is like an airplane.

- B. Four Ways That Birds Serve Man: B-121-3.

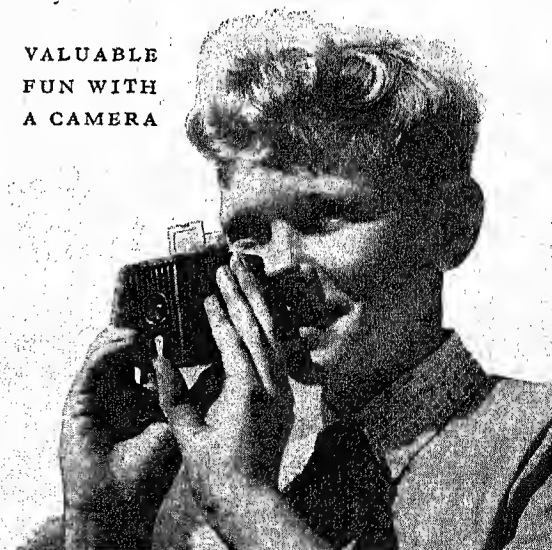
- C. How to Attract Birds to Your Window: B-123-4.

- D. How Birds Sing and "Dance": B-125 and picture.

- E. Amazing Ways Birds Build Nests: B-125-7 and pictures. Many birds disguise their nests for safety.

- F. When Birds Change Their Feathers: B-129-32.

VALUABLE FUN WITH A CAMERA



You can take "prize-winning" pictures with an inexpensive camera if you know the simple tricks of photography and lighting.

- G. How to Recognize Many Important Birds: B-133-40. Here are true-to-life, colored pictures.
 H. What Birds' Feet Tell You: B-129 picture. You can usually discover where a bird lives or how he works by the formation of his feet.

- I. Why Birds' Beaks Differ: B-130. Shape of the beak depends on what a bird eats.
 J. How Feathers Grow and Work: F-20-1. Some feathers are for speed; others for silence.

- K. What Birds Like and How They "Speak": B-141-6. We discover what to feed them, how to help them build nests, and learn the secret of their calls.

Notes: You will find a great deal of surprising lore in the articles on individual birds, such as Oriole; and a number of interesting things to do at the end of the article Nature Study.

- IX. JOINING THE BOY SCOUTS OF AMERICA: Any boy 12 years old or more is eligible to join. Younger boys may become Cubs.

- A. What the Boy Scout Learns: B-211. His motto is "Be Prepared."

- B. How a Boy Scout Troop Is Formed: B-212.

- C. Boy Scouts in Camp: B-215 pictures.

- D. Scouting Activities for Younger Boys: B-217.

- X. JOINING THE GIRL SCOUTS: Girl Scouting is arranged for three age groups: for girls from 7 to 10 years old; for those from 10 to 14; and for girls over 14 years of age.

- A. How Girl Scouting Combines Fun with Worth-while Activities: G-93-4.

- B. The Girl Scouts' Pledge and Laws: G-95.

- XI. JOINING THE CAMP FIRE GIRLS: Any girl over 10 years of age is eligible to join.

- A. Play and Helpful Work All Year Long: C-40.

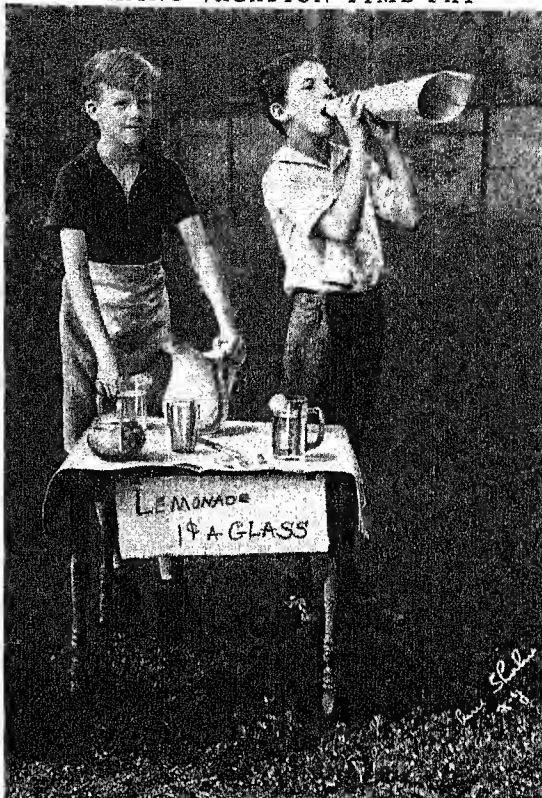
- B. Camp Fire Girls Outdoors: C-41 pictures.

- XII. DISCOVERING THE VALUE OF VACATION JOBS:

The way to get a vacation job is to look for it. Few will ever come to you if you just sit and wait. Many boys and girls start looking several weeks before school is finished. Among the jobs that you can take in vacation are running errands for neighbors or neighborhood stores, mowing lawns, weeding gardens, taking care of children, exercising pets, washing porches, selling flowers or magazines. When you do get a job, remember it is up to you to do it right, or people will stop hiring you. For example, when you go on an errand, do it as quickly as possible—do not stop to play games, and take care that packages you deliver arrive in good condition. Even the jobs that do not pay money are valuable to you. When you do them well, you earn rich experience. Often you discover how to do new things, and how to do old ones better. You will find that putting your heart into your work makes almost any job interesting. When mother asks you to

weed the garden, for example, do not spoil your whole morning by wishing you were playing a game. Instead, challenge yourself to weed the garden as thoroughly as a man would do it. If you are taking care of your little

MAKING VACATION TIME PAY



There are many interesting ways to earn money during vacation. These wise salesmen have learned the value of the right location.

sister, do not spoil your fun and her fun by scolding her. Remember, she does not know so many things as you, but she is trying hard to learn. Often you can help her by answering questions and showing her how to do things, just as older people often help you. No matter what your job is, you will find that it becomes interesting when you start with the idea of doing it well.

—SUGGESTIONS FOR THINGS TO MAKE—

HAVE you ever had the thrill of making something with your own hands? Something that will really work? This vacation is your opportunity to discover the fun of "making something." In the guide below, you will find several suggestions for making a number of things. When you start, challenge yourself to finish. You will find that such interesting activities keep you on your toes every minute.

- I. AIRPLANE MODEL: Both boys and girls are now making model airplanes and flying them. The plane which this guide shows you how to make is easily built and is an unusually good flier. Notice that you need only a few simple parts, and that no matter where you live, you can readily get them.

- A. How to Build a Model Airplane: A-92-4. This gives complete instructions.

- B. How to Fly Your Model Plane: A-94.

- II. ANT HOUSE: Ants live in many ways very much like people. They have an amazing social organization and are great builders, tunnelers, workers, and soldiers. You can discover many of their secrets by building a simple ant house and watching their wonderful work.

- A. Marvelous Ways Ants Live: A-211-2. Each colony is ruled by a queen.

- B. How to Make an Ant House: A-213-4. You need only a glass jar and dark paper.

- III. BASKET-MAKING: Both boys and girls can discover some of the secrets of this ancient lore. Indians wove baskets so well that they could carry water in them.

- A. Men First Used Basketry to Build Homes: B-57.

- B. Indians Used Baskets for Cooking: B-28.

- C. How to Make a Basket: B-59. If you live in the country, you may want to try your skill with natural materials such as the Indians used—rushes, willow twigs, long grasses.

IV. BIRDHOUSES:

There is always use for a good birdhouse. If you have no yard of your own, one of your friends will usually be very glad to have a well-built bird shelter, because birds help to protect gardens and shrubbery from insects. And anyone can make one of the simple, excellent birdhouses which the references below tell you how to build.

- A. How to Make a Wren House: B-143 picture. All the pieces can be cut from one board.

- B. How to Make a House for Larger Birds: B-143 picture.

- V. BOW AND ARROW: A-254. You can be proud to make a smooth, strong bow, for this was one of the most important weapons in history. Today, with modern materials, you can easily learn the art of making bows and arrows.

- VI. KITES: For centuries, kites have been used by soldiers, bridge builders, and scientists. And, as a sport, kiteflying is so popular that many schools hold tournaments. Kites are easy to make, and you can fly them in your own back yard. With some paper and a few pieces of light wood, you can build a good flier.

- A. Easy Way to Make Plain Kites: K-28 pictures.

- B. How to Make a Box Kite: K-26 picture.

- C. How Chinese Boys Make Kites: C-221.

- VII. KNOTS: If you have ever seen a sailor or a Boy Scout tying knots, you have admired the quick way he mysteriously twisted and turned the rope. But any boy or girl can learn this useful art. The guide below will lead you into the mysteries of knot making.

- A. Why Knots Are Important: K-33-4. A person's life may depend on how a knot is made.

- B. How to Make Important Knots: K-34-6 and pictures.

- C. How to Splice Rope: K-36-7 and pictures.

- VIII. FUN WITH NEEDLE AND THREAD: When you know how to sew well, you can be sure of having attractive, well-fitting clothes. Moreover, you can make any

WATCHING ANTS AT WORK



You can watch the amazing work of ants in a house like this or in a glass jar.

number of pretty things for your room. By following the suggestions in the guide below, every girl can learn the fundamentals of good sewing.

- A. Why Every Girl Should Know How to Sew: S-87.
B. What the Beginner Should Sew: S-88. Even simple things such as tea towels, pillow tops, and gay aprons develop your skill.
C. How to Put in Sleeves, Pockets, Buttonholes: S-89.
D. Secret of Lining a Coat: S-90 and pictures.
E. Nine Clever Ways to Make an Elbow Patch: S-91.
F. Eleven Hints by a Sewing Expert: S-92.
G. Kinds of Clothes That Make You Look Best: D-110-3. An expert in dress design tells what tall girls, short girls, thin girls, plump girls should wear.

- IX. PAPER DOLLS OF FOREIGN LANDS: Have you ever seen a gay collection of paper dolls dressed in the native costumes of different countries? The Japanese girl with her lovely, bright kimono? The smiling Hungarian lass in her wide skirts and embroidered jacket? The dark Spanish dancer with her shawl and flame-colored dress? The girl who makes such a delightful collection may well be proud of it. Every girl can do it. Just turn to the article on Spain, for example, and see how clearly the costume of the Spanish street dancer is shown. This is very easy to draw. Or, if you wish, put tracing paper

YOUNG DRESS DESIGNER BEGINS HER CAREER



Every girl can learn the secrets of sewing. With a little practice, you can make pretty things for your doll or room.

over the picture and trace the drawing. Then cut it out, and color it in crayon or paint. In the article on Rumania, you will discover that the people of this country decorate their costumes with bright embroidery. Many national costumes are shown in the article on Play and Games. And so, by looking at the pictures and reading about the people, you will discover their favorite costumes, many of them world-famous for their beauty.

—SUGGESTIONS FOR TRIPS TO TAKE—

HERE is adventure! Something new to discover every minute! Each turn of the road brings you a surprise. No wonder everyone loves to take trips. And, best of all, you can take a trip right now in this vacation. Indeed, there are so many trips, so much to explore, that we had better divide our tours. First, let's consider trips away from home that perhaps you may take this summer. Next, we shall discover how to tour around your own town. Third, we will take imaginary trips—Magic Carpet Tours that will carry us far across the sea into foreign lands.

- I. TRIPS AWAY FROM HOME: Wherever you go—to visit a city or a farm or to drive cross-country in an automobile—there is one sure way to have fun. That way is to find out ahead of time where you are going, and

before you start discover all you can about the places you will see. Thus you will be sure to see everything, and that is the way to get the most out of travel.

- A. Charting the Route: Ask your father to help you chart your route on a map of the United States (U-188-9). Draw light circles around each of the towns on your route.
B. States and Cities: Explore each state and large town by reading articles on them in your encyclopedia. Notice how the pictures show you famous places to look for on your trip. In your reading, you will discover the reason for each state's and town's importance. If you are going to Chicago, for example, you will want to read the article Meat Packing (M-96-101) to see why Chicago is sometimes called "The Hog Butcher of the World." To know why the southern sky is fiery with golden flames as you drive up to Chicago at night, look at the pictures of giant furnaces in the article Iron and Steel (I-133-46).

ALL ABOARD FOR A CRUISE DOWN THE SKY LANES



Boarding a sky liner is always a thrill. And the romance of real travel by air, streamliner, or ship can be captured vividly by imaginative travel. Magic Carpet Tours, made with timetables, realistic pictures, and lively reading, are exciting journeys.

- C. Large Buildings: Be ready to see your first "skyscraper" in some large city. You will discover the marvelous way they are built in the article Building Construction (B-263).
- D. Business Sections: Almost every large city has a "Great White Way." In the article Electric Signs (E-238) you will find out how the brilliant effects are made.
- E. Rivers and Bridges: Explore your map for rivers you will cross on your route. To discover how men make steel or concrete roads across these water barriers, read the article Bridges (B-239-43).
- F. Farms: Along the road you will pass many farms. You can discover many facts about their important work by examining the pictures in such articles as Agriculture (A-47-60), Corn (C-366-9), Cattle (C-101-7).
- II. TRIPS AROUND YOUR OWN TOWN: This vacation is your opportunity to explore the things right around you. Some of these trips you can take by yourself, or with a friend. On others, you will want your mother or father to go with you. And some you can arrange as group tours. Suggestions for these are given farther on.
 - A. How Milk Gets to Your House: There are several dairy farms near almost every town. You can often get permission to explore them. Before you go, however, you will want to know what to look for. —Read the Articles Dairying (D-1-5) and Milk (M-172-3).
 - B. At the Airport: More and more towns are building municipal airports, and usually there is no charge for visitors. Your visit will show you many interesting things about this smooth-running organization.
 - a. Why an Airplane Stays Up: A-67.
 - b. How Commercial Flying Grew: A-79-81. Notice on the map on A-80a how air routes span the world.
 - c. Two Great Airports: A-80b pictures.
 - d. Airways Map of the United States: A-86. Look to see if your town is on an air route.
 - e. How the Airplane Works: A-88-92. This tells how a pilot guides a plane.
 - C. Police Department: Day and night, these "soldiers of peace" are on duty to keep your town safe. Usually the desk sergeant of a police station, or the town marshal, will give you permission to visit the station.
 - a. How Police Departments Are Organized: P-287.
 - b. Duties of Policemen: P-288, P-290.
 - c. Policemen of Different Lands: P-289 pictures.
 - d. How Fingerprints Help Police: F-43.
 - D. Visiting the Fire Fighters: Have you ever been inside a fire station, where the great engine trucks are ready to roar into life at the sound of an alarm? Here you will see how firemen keep on the alert to protect your home.
 - a. When the Alarm Rings: F-53-4.
 - b. How Firemen Are Trained: F-55 and pictures.
 - E. In a Radio Station: Most radio stations will grant you permission to visit their studios. You will understand better what you see if you read about broadcasting before you go.
 - a. Inside a Broadcasting Studio: R-28. This shows you how programs go "on the air."
 - b. How Sound Effects Are Made: R-30.
 - c. What Radio Programs Cost: R-30.
 - F. Exploring a Social Settlement: In practically every large city there is a busy social settlement. By writing or telephoning, you can usually get permission to visit it.
 - a. How Social Settlements Help the Poor: S-181.
 - b. Jane Addams and Her Famous Hull House: A-16.
- III. GROUP TOURS AROUND YOUR TOWN: Make your arrangements a few days in advance. When you have found how many friends will go with you, ask your Chamber of Commerce or the pastor of your church to write to the office of the plant you want to visit and obtain permission for your tour. Most industries are glad to grant permission for group tours and to provide a guide.
 - A. "Where Something Is Always Happening"—the Newspaper Office: To get ready for this trip, you will want to look up the topics suggested here.
 - a. How a Newspaper Works: N-104-9.
 - b. Making Words from Molten Lead: L-149-53.
 - c. How Dots Make Newspaper Pictures: E-296-8.
 - d. Pictures Sent on Telegraph Wires: T-42 and picture.
 - e. How Newsprint Is Made: P-57-63.
 - B. Laundry and Cleaning Plant: Great whirling machines and skilful workers have many surprises for you here. —Inside a Modern Power Laundry: L-71.
 - C. Bakery: In large cities there are wholesale bakeries, which turn out thousands of loaves a day. These giant bakeries are marvels of ingenious machinery.
 - a. How Machines Make Bread: B-228-30.
 - b. Breads of Many Lands: B-231-2.

IV. MAGIC CARPET TOURS: "Some day I'm going there—some day I'm going to travel!" How often every boy and girl has said that! And men and women, too. But you do not have to wait for "some day." You can explore right now! Just step aboard the Magic Carpet, and travel to the far-off places of the world. You can take a new trip every day! You will be surprised at how real these imaginary journeys seem when you plan them just as if you were really going away. Travel agencies and steamship companies will send you pictures and literature about foreign countries and ocean ships. In the guide below, you will find several suggestions for tours and cruises. To make these, and hundreds of others that you will find in your Compton's, look in the Fact-Index for the name of the place you want to visit, and then explore all the references given under it. Let's start right now and see how easy this is to do! We choose Alaska, the treasure house of the north, for our model tour.

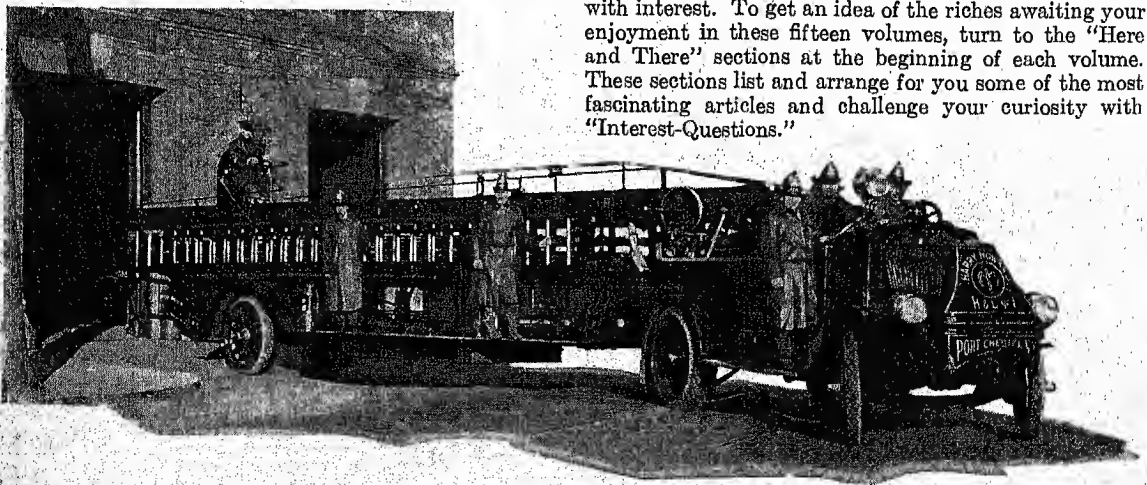
- A. To Alaska by Airplane and Ship:** Starting from hustling Chicago, we shall fly on the night, or sleeper, plane to Seattle.
- a. Seeing Chicago, the Windy City: C-186-98.
 - b. Aboard the Airplane:
 - 1. Giant Airport at Night A-82 picture.
 - 2. Our Plane Is Ready to Take Off A-806 picture.
 - 3. Inside a Sleeper Plane A-83 picture.
 - c. Flying the Continent:
 - 1. Map of Our Route to Seattle A-86.
 - 2. Crossing the Mighty Mississippi M-203-206.
 - 3. Soaring Above the Rockies R-123-4.

- d. Seattle, City of Ships and Hills: S-71-2. Here we embark for our voyage to Alaska.
 - Steaming out from the Harbor: H-214-7.
- e. Aboard Ship on the Pacific Ocean: Now we can explore the mysteries of an ocean liner.
 - 1. How a Ship Is Built S-121, S-122 pictures; in a shipyard S-124-6.
 - 2. How Ships Find Their Way N-46-50.
 - 3. Eye of the Ship C-325-6.
 - 4. How the Coast Guard Aids Sea Safety C-289.
 - 5. Lighthouses and Their Thrilling History L-131-4.
- f. Sailing the "Rolling Main":
 - 1. Mysteries of the Ocean World O-195-201.
 - 2. Secret of Waves W-57-8.
- g. Exploring Far-Off Alaska: We sail past the towering mountains of the coast into Seward.
 - 1. From "Ice Box" to Treasure House A-100-7.
 - 2. Highway to the Yukon's Gold Y-214.
- B. Other Tours and Cruises:**
 - a. Norway and Sweden—The North Cape Cruise to the Land of Northern Lights.
 - b. St. Lawrence Cruise to Gaspé and Newfoundland.
 - c. Hawaii by Clipper Plane.
 - d. England, Motherland of an Empire.
 - e. The "Grand Tour" of Europe.
 - f. Egypt, Land of the Pyramids.
 - g. America's National Parks, Wonderlands of Beauty.
 - h. China, Japan, India—the Ancient Orient.
 - i. Paris, Queen City of the World.
 - j. Rome, the "Eternal City."

—READING FOR FUN—SOME HELPFUL SUGGESTIONS—

COUNTLESS hours of thrilling entertainment, adventure, mystery, romance await the person who has found out how and what to read. Books open up to you new worlds, create new interests, arouse new ambitions, and suggest new activities. The secret of building up reading interests lies in discovering what books to select. This is easy when you have a well-chosen list of titles at hand, and notes to tell what the book is about. You will find many such lists in Compton's. These lists lead you to books that will make your leisure time enjoyable and immensely profitable.

Suppose, for example, you have not discovered the joy of "riding a hobby." Just open your Compton's to the section on Hobbies (H-313-313n). There you will find a list of the favorite hobbies of boys and girls everywhere, and interesting books that tell you exactly how to begin and carry on a hobby of your own.

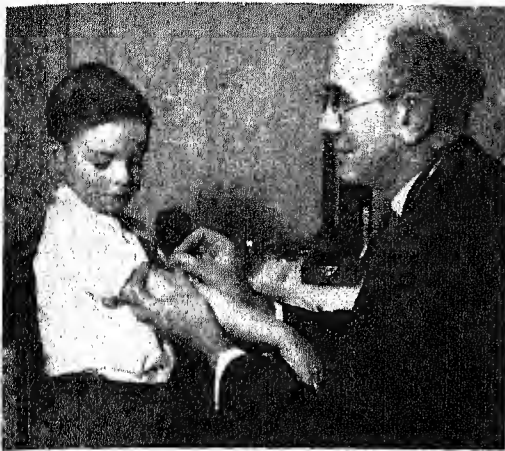


Many of you, of course, already have favorite interests, such as collecting, baseball, tennis, flying, radio, nature study, and music. Whatever your interest is, there is always something new to discover about it, if you know where to look. And that is easy when you use the Reference-Outline and Bibliography that follow each of the articles on the great fields of knowledge in Compton's.

There is a whole world of fun and adventure in stories. You have often said, "I wish I had something to read, but I don't know what to get." Now you can have your wish. In your Compton article Seven Stories High (L-110-121), you will find lists of excellent books that have become favorites with all young people. The lists are arranged in age groups and they briefly describe each book mentioned.

Nowhere can you find more exciting reading material than in your own Compton's, for every article is alive with interest. To get an idea of the riches awaiting your enjoyment in these fifteen volumes, turn to the "Here and There" sections at the beginning of each volume. These sections list and arrange for you some of the most fascinating articles and challenge your curiosity with "Interest-Questions."

HOW DISEASES ARE PREVENTED BY VACCINATION



VACCINATION. One summer afternoon in the year 1768 a young milkmaid came for advice to a small hospital in Berkeley, a town in Gloucestershire, England. The physician in charge spoke of smallpox, which in those days was among the most dreaded of diseases. "Oh," said the milkmaid, "I cannot take that disease, for I have had cowpox."

This remark merely expressed the common belief among the country people of the neighborhood, and it passed unnoticed by all except a young medical student named Edward Jenner, who was getting his first training in surgery. His alert mind seized upon the idea suggested by the milkmaid, and it occupied his attention constantly while he was completing his medical education in London. He returned to practise in his native village in 1773, and for the next 20 years devoted his spare time to investigation. He found that what the milkmaid had said was true. Those who had had cowpox, which is a mild disease in human beings, very rarely caught smallpox.

Jenner's First Experiment

Why not, thought Dr. Jenner, find a way to give people a light attack of cowpox and so safeguard them from the horrible plague of smallpox? In 1796 he made his first experiments. He took from the skin of persons suffering from cowpox small quantities of pus, with which he inoculated several children. From the sores which developed on these first patients, he inoculated others. In 1798 he made his first great test. Four children who had undergone inoculation with



At the upper left we see the simple operation that safeguards a child against smallpox. With modern methods in the hands of a good physician it is painless and safe. The other two pictures show the preparation of typhoid vaccine. Typhoid fever has been virtually stamped out of the United States Army and Navy by the use of this vaccine, which is prepared in immense quantities in the Army Medical School at Washington. Cultures of the proper bacteria are mixed with salt solution and some such preservative as carbolic acid, filtered into glass containers, and then subjected to a temperature of 140° to 150° for an hour to kill the bacteria. The dead bacteria create immunity.

cowpox were inoculated with smallpox. Not one caught the disease. So Jenner had made the great discovery of vaccination, which today has almost wiped out one of the most deadly of diseases.

The substance used in vaccination is called smallpox "vaccine" from the Latin *vacca* meaning "cow." This is no longer obtained, as in Jenner's day, from other human beings; but is cultivated in calves, under expert care, to make sure of its purity. From its discovery down to the present day, vaccination has had many opponents; but its value has become so firmly established that most civilized countries make it compulsory. In the United States the question of vaccination is for the most part regulated by local and state authorities.

Effect Lasts Several Years

Vaccination will give a child or grown person immunity from smallpox for several years, but the treatment must be repeated from time to time to give permanent protection. So far-reaching have been the effects of this discovery that even when a person does have smallpox today, it is usually in a very mild form.

Vaccines have been developed against several other diseases. A person may be made immune to typhoid fever by inoculating him with killed typhoid germs. Diphtheria is prevented by inoculating children with the poison or toxin of the diphtheria germ which has been made harmless by chemical treatment. Persons entering areas where yellow fever has not been stamped out can be made immune for several months with a vaccine. (See also Antitoxins; Germ Theory of Disease.)

VACUUM. One of the hardest things in the world to get is "nothing." Scientists have been trying for many years to produce a perfect vacuum, that is, a bit of space with absolutely nothing in it, but so far they have failed. The reason is plain. Take a bottle and attach an air pump to it. With the first stroke you remove part of the air. But the remainder immediately expands and fills the bottle again. Keep on pumping as long as you like, yet the slight quantity of air left behind will always spread out and occupy the entire bottle (*see Gas*). The pressure inside gets smaller and smaller but never quite disappears.

Perhaps you question that word "pressure" when we are talking about a vacuum. Isn't a vacuum something that produces suction—the very reverse of pressure? This seeming contradiction clears up when we recall that the so-called "force of suction" is not really due to the "pull" of the vacuum but to the "push" of the air outside (*see Air*). One way to measure the vacuum in our bottle is to find the difference between this larger outside push and the smaller push inside. Atmospheric pressure at sea level is about 14.7 pounds per square inch. This is about equal to the pressure exerted by a column of mercury 30 inches high. Let us, therefore, fasten one end of a long U-shaped mercury tube called a *manometer* to our bottle, leaving the other end open to the pressure of the atmosphere. If there were no counteracting pressure in the bottle, the mercury would, of course, be forced up on that side a full 30 inches. But if it falls short of this by two inches, this indicates a remaining pressure equal to two inches of mercury—about one pound to the square inch.

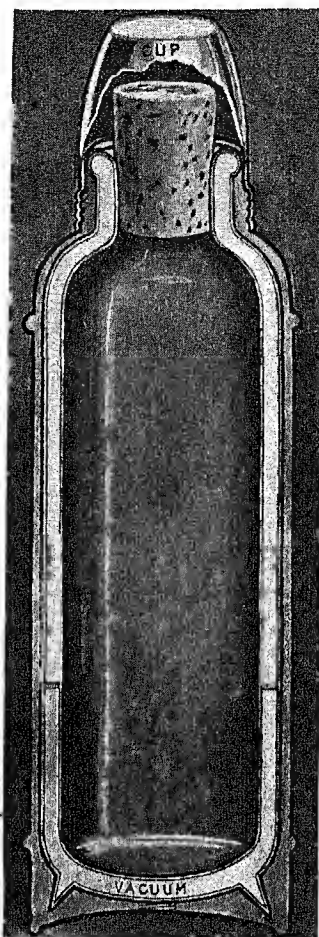
Producing a Vacuum

Why can't we produce a perfect vacuum by withdrawing a liquid such as mercury from a space which it previously filled? Because all substances, including solids, exude their own vapors or other gases ordinarily imprisoned near their surface as soon as the surrounding pressure is greatly lowered.

After as much air or gas as possible has been removed by mechanical pumps, the vacuum can be further perfected by the use of mercury vapor pumps of the Gaede or Langmuir type. Vapor rising from heated mercury shoots past the opening of the vessel which is being evacuated. There it entangles many of the gas molecules remaining in the vacuum and

carries them away. By this method, a vacuum can be produced so nearly perfect that the pressure left is less than one ten-billionth of the atmospheric pressure. Yet this still contains *more than a billion molecules of gas per cubic inch.* (*See Atoms and Electrons.*)

A VACUUM BOTTLE



Two things help to keep heat from passing inward or outward through the hollow walls of this bottle. The hollow is a vacuum which blocks the passage of heat by *conduction*, and the walls are reflectors, like mirrors, which tend to turn back the heat that would otherwise cross the vacuum by *radiation*.

Scientific interest in vacuum centers largely upon the behavior of the small quantities of remaining gases when electric currents are passed through them. Experiments of this kind led to the discovery of X-rays and electrons, and to many basic inventions, such as radio tubes. (*See Radio; X-rays.*) The commonest use of vacuum is in electric lamps from which air is removed to prevent the filament from burning up (*see Electric Light and Power*). In the manufacture of these lamps and other types of vacuum tubes, chemicals are often placed inside them which tend to absorb the remaining gases or turn them into solid compounds as soon as these are heated. Chemicals so used are called "getters."

Vacuum cleaners consist of fans or pumps which draw dust into collecting bags. In large buildings the suction is often produced by a central pump with hose attachments on each floor. Because vacuum speeds up evaporation and lowers the boiling points of liquids, it plays an important part in industrial chemistry, food and paint manufacture, oil and sugar refining, refrigeration, ice making, and many other processes.

VALENCIA, SPAIN. Every morning at daybreak the dwellers of the fertile plain in which lies Valencia, one of Spain's two great Mediterranean ports and her third largest city, begin listening for the great bell of the cathedral. Its ringing hour by hour is the sign of each man's turn to release the waters into the channels that make his dry land fertile. And

every Thursday is held the oldest tribunal in Spain, the "tribunal of the waters"—a meeting of the peasants themselves to decide whether any have used the water contrary to regulation. Under such careful irrigation the plain (or *huerta*, in Spanish) yields four or five crops a year, and seems like a great orchard of citron, orange, and mulberry trees for silkworms, to which Valencia owes much of its prosperity.

Set in this garden region which the Moors trained to fertility many centuries ago, Valencia is one of the most Moorish-looking of Spanish cities; for many of its ancient streets are winding and narrow; and its

blue sky is cut by white, gold, and blue domes and towers that overtop the modern stone buildings of commerce. The city lies two and one-half miles from the mouth of the Guadalquivir River, and its harbor (El Grao) is one of the safest on the whole Mediterranean. It exports rice, melons, oranges and other fruits, wine, silk, and olive oil. Silk spinning is one of the leading industries, and the Silk Exchange, a beautiful Gothic building, is one of the best surviving examples of civil architecture in the Middle Ages. Other industries are hemp and linen weaving, tobacco manufacture, and the making of the bright-colored glazed bricks known as *azulejos*, which play so important a part in the beauty of Valencia itself and other Spanish cities. Valencia is also noted as the seat of one of the foremost universities of Spain.

Blasco Ibañez, the novelist, was a Valencian by birth, and in his books 'The Cabin' and 'Mare Nostrum' you may read of the life on the huerta and the spell of the Mediterranean as a Valencian sees them. Population, about 320,000.

VALLEY. Like other land forms, river valleys are constantly changing. At the same time that the river is deepening its bed, other forces—rain, frost, wind, and the atmosphere—are loosening the material on the valley walls so that it falls into the stream and is carried away. The form of a valley is determined by the relative rapidity with which these two agencies of deepening and widening carry on their work. At first the deepening will proceed more rapidly. When, however, the stream approaches the level of the body of water into which it empties, it grows more sluggish and deepening is halted; but the slow stream aids the process of widening by swinging from side to side when confronted by obstacles in the channel. In arid regions, as in western United States and Mexico, the deepening forces far outstrip the weathering process, and deep gorges are formed (*see* Canyon).

Valleys are classified according to their form as young, mature, and old. A young valley is narrow with steep sides, and carries a vigorous stream. A mature valley is deep and open, having flaring sides and gentle upper slopes; and an old one is very wide, with a broad bed and extremely low slope. These terms, however, do not refer to years but to stages of development. A river working on soft material may bring its valley to old age in less time than that required by a stream opposed by hard rocks, and a single river valley may be both "young" and "old" in different parts.

The word "valley" does not necessarily indicate the presence of a river. The term is applied to depressions made in other ways, and to long narrow "structural valleys" created by movements of the earth's surface. Glen, dale, dell, and dingle are somewhat poetic words for small secluded valleys.

VALLEY FORGE, PA. The little village of Valley Forge, famous as the winter quarters of Washington and his army during the terrible winter of 1777-78, lies about 20 miles northwest of Philadelphia.

The American army of about 11,000 had encamped there in December 1777, after the battles of Brandywine and Germantown. The place was chosen partly because it lay between the British army in Philadelphia and the Continental Congress in York, Pa.

That winter was the darkest time of the whole Revolutionary War. "Nearly 3,000 men were unfit for duty because they were barefoot and otherwise naked. Hundreds of horses starved to death. Men yoked to the provision wagons like oxen brought meager relief to their starving comrades, who lay in huts or wigwams of twisted boughs." Washington pleaded with Congress to relieve the suffering, but Congress was inefficient or powerless. Many of the soldiers succumbed to the hardships, and over 2,000 deserted to the enemy.

The time spent at Valley Forge was not lost to the army. During the winter there arrived in the camp Baron Steuben, an officer of the famous army of Frederick the Great of Prussia, and before spring he had made of the American troops a well-trained and efficient army.

Today a part of the old camp ground has been converted into the Valley Forge Park, in which still stand Washington's headquarters, together with other old and modern buildings and numerous memorials of that trying time.

VALPARAISO (*vál-pá-rí-zō*), CHILE. Ships from all over the world may be seen in the broad open bay of Valparaiso, for it is the largest and busiest port on the Pacific Coast south of Los Angeles. The harbor offers good protection from southerly and westerly storms, but the bay is open from the north, where it is about 2½ miles wide. Its great depth long retarded the efforts of the government to build breakwaters to protect shipping, but extensive improvements were begun in recent years.

"Paradise Valley"—for that is the meaning of "Valparaiso"—is a singularly inappropriate name for this crowded commercial and manufacturing city, set in a semicircle of rugged barren hills. From the bay, one sees first the business district on the narrow strip of shore; then, farther back, the residential section, rising sharply from the bases to the very tops of the hills and cliffs. Elevators and cable railways carry passengers to the various levels. On one of the highest of these stands Chile's naval academy, looking out toward Viña del Mar. This resort, six miles from the city, is noted for attractive residences and fine beaches. Buildings of steel-framed concrete have been the rule since the earthquake of 1906, one of several which have severely damaged the city.

Valparaiso is the western terminus of the Transandine railway, which connects it with Mendoza in Argentina. The important manufactures include textiles, sugar, foundry products, paints, varnishes and enamels, cottonseed oil, bakery goods, candies, shoes, tannery products, drugs, cosmetics, and chemicals. Population of Valparaiso proper, more than 200,000. of its suburb, Viña del Mar, about 50,000.

The CHARACTER and CAREER of VAN BUREN

VAN BUREN, MARTIN (1782-1862). The "Little Magician" of Kinderhook, as Martin Van Buren was called, was one of the unfortunate presidents of the United States. Coming to the White House in 1837, as the eighth to hold that office, he reaped in the panic of that year the "whirlwind" which had been sown by his predecessor and sponsor, Andrew Jackson. The odium which attached to his name at that time for years rendered any just estimate of Van Buren impossible, but today he is regarded as a real statesman, as well as a politician of the spoilsman type. Woodrow Wilson in his 'History of the American People' gives this estimate of Van Buren: "Not a little strength of character underlay Mr. Van Buren's bland exterior, his conciliating manners, his air of sweet accommodation. He was also, in his way, a consummate master of men. He mastered them by insight, by intimate and friendly counsel, and by knowing the end he sought. He did not rule or dominate by force of will. But that slender little gentleman was always courteous, always placid, always ready to listen and wait to get his way." Calhoun, however, asserted that with him "justice, right, patriotism, were mere vague phrases."

Martin Van Buren was a native of the state of New York, and as his name indicates, was of Dutch descent. His father was a farmer, and according to some was a tavern-keeper at Kinderhook, near Albany. The boy's schooling was obtained in the village school and in Kinderhook Academy, but at 14 years of age he left school and entered a law office as an errand boy. For seven years he served an apprenticeship in law offices at Kinderhook and Albany, and at the end of that time he was admitted to the bar.

Though he proved a successful lawyer, his chief interest centered in politics, in which field he first appeared in 1803 as a supporter of the Jeffersonian candidate for governor of New York. Political parties in that state were already beginning to change and in the factional struggle which followed, Martin Van Buren took an active part. In the "Albany

Regency," a group of politicians who ran New York, Van Buren was a leader. From this came his nickname, "King Martin the First." During this period he served in the state legislature and in Congress.

With his election in 1828 as governor of New York, Van Buren gave up his law practice; but he held the position of governor for only two months, resigning it to become secretary of state under President Jackson. This step marked his real entrance into national politics. As supporter and campaign manager of Jackson, he rose rapidly through the different steps—secretary of state, minister to England, vice-president, and finally president. In the first three positions he did nothing noteworthy, but he became marked as the destined successor to Jackson in the presidency. It was to keep him out of factional disputes and so render him an available candidate for the presidency in 1836 that Jackson in 1831 appointed him minister to England. The Senate, however, spoiled this plan by refusing to confirm the nomination, though Van Buren had already left for his post in London. The action of

the Senate did not hurt Van Buren, for the next year he was elected vice-president, and four years later succeeded Jackson in the presidency, with R. M. Johnson as vice-president.

Van Buren entered his term of office pledged to follow the footsteps of his predecessor. By so doing he not only continued the "spoils system" of politics but he assumed the burden of all of Jackson's mistakes. In a few short months the panic of 1837 began. Banks closed their doors; business houses failed; industry was paralyzed. The crisis showed that Jackson's policy of depositing government funds in private banks was a dangerous proceeding because the surplus money tempted the bankers to engage in speculation, and if these speculations failed the government lost its money. To provide a safer means of keeping government funds, Van Buren favored the establishment of an "independent treasury," and after a three years' fight with Congress a bill providing for this was passed in 1840.



VAN BUREN'S ADMINISTRATION

1837-1841

Financial Panic (1837).

Continuation of the War with the Seminole Indians.

"Aroostook War" between Maine and Canada (1838-1839).

First Photograph taken in America (1839).

Process of Vulcanizing Rubber discovered (1839).

Subtreasury established (1840).

"Hard Cider" Campaign resulting in Whig Victory (1840).

Another unwelcome inheritance from the Jackson administration was the most fierce and costly of any of the Indian wars, the Seminole War in Florida (1835-42). A large part of this tribe refused to cede its lands and move to Indian Territory in accordance with the provisions of the treaty of 1834. It was not until the government had spent thousands of lives and \$10,000,000 that the Indians were finally subdued. Meanwhile Van Buren was confronted with the "Aroostook War," a conflict between Maine and Canada over the Northeast Boundary question. In 1838, Maine fortified the line which she claimed and prepared to fight if necessary. It was chiefly due to Van Buren's good judgment that actual conflict was averted and the matter left to settlement by Great Britain and the United States. No small amount of credit is also due this unpopular president for his executive order establishing a ten-hour working day in all government plants.

But the people, still suffering from the panic of 1837, saw in Van Buren's administration only failure to relieve their distress. In the election of 1840 the Whigs, putting all their emphasis on the hard times, won a decided victory after a campaign famous for its enthusiasm (see Harrison, William Henry); and Van Buren's public career was ended at the end of his single term as president. But he still maintained his interest in politics. He was a Democrat, but he opposed the annexation of Texas, and approved of the Wilmot Proviso which forbade slavery in the territory acquired from Mexico. This last stand led to his nomination for the presidency in 1848 by the "Barnburners" and Free Soil parties, but he was disastrously defeated. He maintained his connection with the Democratic party for the rest of his life; but after Lincoln's election in 1860 he supported him in the dark days of the Civil War. He died in 1862, believing that the Union cause would triumph.

VANCOUVER, BRITISH COLUMBIA. When one sees the wonderful harbor of Vancouver, the metropolis of British Columbia, filled with ships from China, Japan, Australia, and India, it is hard to realize that in 1880 the site of the present city was covered by a trackless forest. The city was laid out as the western terminus of the Canadian Pacific Railway. Fire destroyed the new town in 1886, but a more substantial city of stone and brick rose on its ruins. In 1936 Vancouver held a golden jubilee to celebrate the 50th anniversary of its incorporation.

Built on a peninsula projecting into a spacious arm of the ocean, the city has 98 miles of water frontage. It has another great industrial advantage in the unlimited electric power which may be developed by harnessing the torrents of the mountains which surround it. It is the center of the Canadian salmon-canning industry and is one of the world's greatest exporters of wheat. Other leading industries of the Vancouver district are lumbering, mining, fishing, paper and pulp manufacture, ship-building, iron and steel manufactures, sugar refining, and meat and fruit packing.

The Panama Canal has revolutionized transportation on the west coast. Formerly freight went across the continent by rail. Now much of the commerce of Western Canada pours into Vancouver and goes by ship through the Panama Canal to the Atlantic seaboard and all parts of the globe. Vancouver has one of the best harbors on the Pacific coast, and ample railroad facilities. Grain, lumber, and minerals go out to world markets through Vancouver, and manufactured supplies of all kinds move through it into Western Canada. Vancouver ranks third among the cities of Canada, with a population of 246,593. It is the seat of the University of British Columbia. The city is noted for its delightful drives along the wooded shores of the ocean inlets, and leading into the mountains which surround it on three sides. Stanley Park, with its giant trees, is world famous.

Across the Strait of Georgia lies the island of Vancouver, named after the British navigator, George Vancouver, who sailed around it in 1792. The island, with an area of 13,500 square miles, is the largest of the countless islands which fringe the coast of British Columbia. It has rich deposits of iron and copper ores, and its coal mines supply the whole Pacific coast. Dense forests of magnificent timber abounding in big game cover most of its surface, and its rivers yield gold and are a potential source of incalculable water-power. Where the land has been cleared it produces cereals and fruits abundantly, as well as providing excellent pasturage. The chief city is Victoria, the capital of British Columbia (see Victoria).

VANDALS. Looted churches, wrecked buildings, and shattered statuary marked the path of these German barbarians of the early Middle Ages. So wantonly did they plunder the country through which they passed that ever since the word "vandal" has meant one who recklessly destroys property.

At the beginning of the 5th century A.D. the Vandals left their home on the Baltic Sea and joined the German migrations to the south and west. Crossing the Rhine, they invaded Gaul, where they were defeated in a great battle with the Franks, and were glad to cross the Pyrenees into Spain (409). Here they remained for about 20 years, until Genseric (Gaiseric) became king. Short of stature and with a limping gait, this man certainly did not possess a commanding appearance, but his genius for war and leadership made him one of the great barbarian rulers. For 50 years he was the terror of Rome and Constantinople.

About 428 Genseric gathered up his people and moved them, together with all their possessions, across the Strait of Gibraltar into Africa. It is said that this exodus was due to an invitation from a discontented governor in the African provinces of Rome, who supplied the ships for the passage. If this was so, he must soon have repented of his folly. Genseric promptly conquered all of the Roman territory and even established his capital at Carthage, which the Vandals continued to hold for nearly a century.

Not content with his conquests by land, Genseric built a fleet of ships which roved up and down the Mediterranean preying upon the luckless vessels that crossed their paths. When, in 455, Genseric received an appeal for help from the widowed Empress Eudoxia, the head of a faction in Rome, he gleefully embarked in his pirate fleet and sailed north to capture Rome. This was accomplished without difficulty and for 14 days the Vandal army systematically gathered up the wealth of the city to carry it away to Carthage. Nor were gold and silver their only booty. Eudoxia and her daughters were taken captive, and one of the girls was later married to Genseric's son. Expeditions sent out to punish Genseric failed disastrously and the barbarian king ruled in the secure possession of his conquests until his death in 477.

The Vandals continued to be a source of terror for the Romans, both because of their warlike depredations and because of their persecutions of the orthodox Christians. The Vandals themselves had been converted to the Arian form of Christianity and lost no opportunity to attack the other party. At last, in 533, Justinian sent his great general, Belisarius, against them. After several battles he conquered them and carried their king to Constantinople to march through the streets before his triumphal car, a captive. Most of the men were drafted into the Roman army. Those who remained in Africa intermarried with the Roman provincials and the Vandals disappeared from history.

VAN DYCK (VAN DYKE), SIR ANTHONY (1599-1641). In his wonderful series of portraits this gifted painter left a pictorial history of his colorful age such as we have for few other periods. Through the work of his master-hand we are as familiar with the faces of Charles I of England, Queen Henrietta Maria, and their delicate-featured children as we are with those of our contemporaries. Immortalized by his art, the dashing and splendid lords and ladies of the English court—so many of whom lost their lives in the struggle between Cavaliers and Puritans—live again for us and will continue to live as long as paint and canvas hold together. His magic brush also perpetuated for us the haughty features and sumptuous apparel of the patricians of Genoa, and of the kings and queens and dignitaries of most of the courts of Europe.

Besides this unsurpassed collection of portraits, on which his fame chiefly rests, Van Dyck also painted scores of great church paintings and scenes from history and mythology. Works of his incredibly prolific and industrious hand are found in nearly every important gallery of Europe and America.

From this Flemish artist, who spent less than nine of his twenty-five years of production in England, stems the English school of portrait painters. Reynolds, Gainsborough, and their followers derived their chief inspiration from him. So thoroughly is he identified with the art history of England that it is hard to realize that his work at the English court occupied only about one-third of his productive life.

The characteristic note of Van Dyck's portraits is distinction. A mysterious grace and delicacy and charm pervade them all. His people are patricians to their finger-tips. The figures are tall and stately, with heads proudly poised and long tapering fingers. Glaming jewels sparkle on their hands and breasts, and they are clothed in lustrous satins and rich brocades. As a painter of children he was at his best. With them he obtained effects of naturalness and vivacity missing from many of his portraits, with their rather stiff constrained poses. He delighted in dogs and horses and often brought them



VAN DYCK
Painter of Kings and Queens

into his portraits, with gorgeous backgrounds of splendid gardens and marble terraces and balustrades.

Van Dyck's genius matured early. He began to study painting in Antwerp at ten, and about ten years later he entered the studio of Rubens, the greatest painter of the age, to assist the master in carrying out his great compositions. Already his skill was so great that in portraiture he was a worthy rival of his great employer. His fame spread to England and he was brought to King James's court. This first visit to England was brief, and the young painter soon went to Italy, where he spent four years studying the great masters, especially Titian, and rapidly producing scores of his magnificent religious and mythological canvases. During these years he also painted the wonderful series of portraits of the patricians of Genoa.

In 1626 he returned to his native city, a famous and fashionable painter. For six years he remained there, painting princes and nobles and rich burghers, with occasional visits to other cities of Europe to execute commissions. Then came the invitation to the court of Charles I. He was knighted, given a pension, and had the King and Queen for his first sitters. So great did his vogue become that he set up a studio like Rubens, with assistants to block in the painting from his preliminary sketches. In the later years of his life he grew careless and allowed many inferior and ill-finished paintings to go out under his name.

In 1640, the year that Rubens died, Van Dyck went to Paris, hoping to get a commission to decorate the Louvre. He failed, and returned to London, where he died the following year.

VANILLA. When the Spaniards first landed in Mexico, they found the Aztecs flavoring chocolate with a strange sweet-smelling extract obtained from the fermented pods of a kind of orchid. This new flavor was vanilla, today the commonest of all flavoring extracts. It is used in baked food, confections, and beverages, and also in the manufacture of perfumes. Vanilla "beans," as the pods are called, were classed with silver and gold among the treasures that were sent to Spain from the New World in the 16th century. The fame of their flavor quickly spread through Europe. But they long remained too scarce for wide use. Under natural conditions, only one in a hundred vanilla flowers matures into a pod. A membrane separates the stamen and pistil of each flower so that it cannot fertilize itself. Until the 19th century, it had to depend for pollination upon the wind or the rare visits of insects.

In Madagascar, where the vanilla plant was introduced between 1830 and 1840, workers were taught to transfer the pollen by hand, and vanilla production began on a large scale. Today Madagascar is the world's chief producer, followed by Mexico and the Netherlands Indies. Central America, the West Indies, and Tahiti are minor producers.

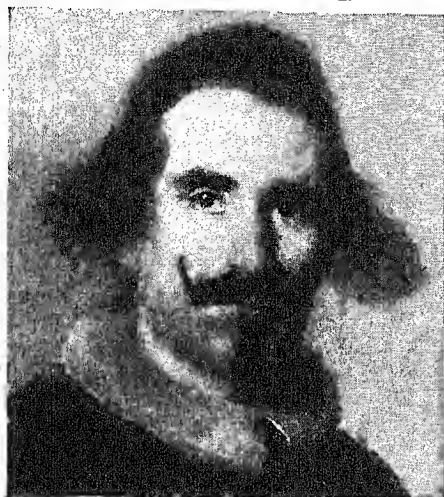
Seven or eight months after pollination of the flowers, the beans are harvested. They are without odor or flavor until cured. This is done by alternately warming them in the sun and then putting them into "sweat boxes" to ferment. During the fermentation, the volatile oil *vanillin* is formed. To make vanilla extract, the vanillin is dissolved in alcohol.

Synthetic vanillin, costing less and now more widely used than the natural, is made from oil of cloves; from lignin, a by-product of wood pulp; or from coal tar. It is often flavored with an extract from the tonka bean, which is the seed of a tall tree (*Dipteryx odorata*) growing in northern South America.

Scientific name of vanilla plant, *Vanilla planifolia*. Its leaves, oblong and fleshy, measure 4 inches. Flowers large and yellow, as many as 20 in cluster. Pods 6 to 10 inches long, containing tiny seeds. Vanilla plants, like many other orchids, twine aerial roots and slender stems around trees.

VARNISH. Transparent solutions of gums or resins used to coat wood or other surfaces are called varnishes. They are named for the solvent used, as *spirit varnish*, in which the solvent is alcohol or turpentine; and *oil varnish*, made with a drying oil like linseed. The natural gums or resins used are copal, dammar, mastic, sandarac, rosin, and lac (for making shellac). These are now being replaced to a great extent by synthetic resins. (See also Paints and Varnishes.)

VELASQUEZ (*vā-lās'kāth*), DIEGO RODRÍGUEZ DE SILVA (1599-1660). "There is only one thing lacking in this picture," said King Philip IV of Spain, as he examined with delight the latest masterpiece of his famous court painter Velasquez. It represented his little daughter—surrounded by her family, her ladies-in-waiting, her dwarf, and her dog—posing while



VELASQUEZ
"The Painter's Painter"

Velasquez is shown standing at his easel. "Give me the brush," he added. Wonderingly Velasquez, "king of painters," obeyed; and Philip IV painted upon the breast of the artist in the picture the red cross of the Order of Santiago, the highest honor attainable by a Spanish nobleman.

It is thus, we are told, that the king hinted of the honor he was to bestow three years later upon Velasquez, Spain's greatest painter and one of the supreme artists of all time. So superb was his mastery of technique, so vigorous and independent his individuality, that his influence on the art of Europe has probably been

greater than that of any other painter.

Velasquez was a lawyer's son of noble Portuguese descent. He was born in Seville the same year that Van Dyck, the great Flemish painter, was born at Antwerp. In his early teens the boy, already well educated, began to study art with one of the famous painters of his own city. But the young artist, who stoutly declared, "I would rather be the first painter of common things than second in higher art," engaged a peasant boy for a model, learned much from nature, and was to a great extent his own master.

After his marriage at 19, Velasquez went to Madrid. When he was 24, he painted an equestrian portrait of Philip IV, the melancholy art-loving king, who thereupon became his friend and patron for the 36 remaining years of his life.

The artist made two visits to Italy, the first in 1629, when he copied masterpieces in Venice and Rome; the second 20 years later, when he bought many of the paintings of Titian, Tintoretto, and Veronese, and 300 pieces of statuary for the Royal Gallery of Spain. Except for these journeys, his life was spent at Madrid as court painter. His more than 200 paintings include landscapes, mythological and religious subjects, and scenes from common life (*genre* pictures); but most of them are magnificent portraits of royalty and court notables, ranking with those of Titian and Van Dyck. Duties connected with royal offices also occupied his time, particularly those as marshal of the royal apartments, which involved the responsible task of looking after the royal quarters at all times, and of planning fêtes and ceremonies.

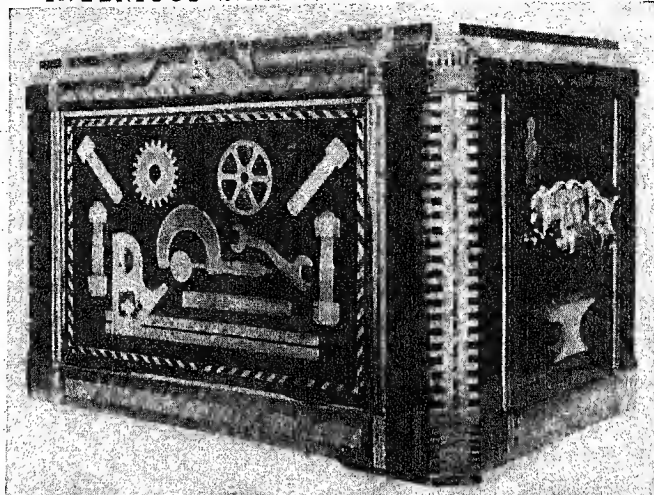
In 1660 Velasquez had charge of his last and greatest ceremony—the wedding of the Infanta Maria Theresa with Louis XIV of France. This was a most elaborate affair, the princess traveling with a cavalcade 18 miles long, and the preparations and ceremonies lasting from March to July. Fatigued with these labors, Velasquez contracted a fever from which, on August 6, he died.

Velasquez was a modest, sincere, kindly genius, who has rightly been called "the noblest and most commanding man among the artists of his country." He was above all a master realist. Truth was his ruling passion, and no painter has surpassed him in the ability to seize essential facts and fix them on canvas with a few broad sure strokes. "His men and women seem to breathe," it has been said; "his horses are full of action and his dogs of life." Because of his consummate skill in merging color, light, space, rhythm of line and mass so that all have equal value in a balanced composition, he has been called "the painter's painter." Since the day he befriended and taught the young Murillo, Velasquez has directly or indirectly led painters to make original, even revolutionary, contributions to the development of art.

Among those who have been noticeably influenced by him are Goya, Corot, Courbet, Manet, and Whistler.

Velasquez' famous paintings include 'The Surrender of Breda', equestrian portrait of Philip IV, 'The Spinners', and 'The Maids of Honor' (in Prado National Museum, Madrid); 'Pope Innocent X' (in Doria-Pamphili Gallery, Rome); 'Christ at Emmaus' (Metropolitan Museum, New York City); 'Woman Sewing' (National Gallery of Art, Washington, D. C.).

INGENIOUS EXAMPLE OF VENEER WORK



Into the dark background of walnut veneer on this tool chest have been set veneer inlays of various lighter woods. By carefully combining woods of varied tones, the workman has given the designs a three-dimensional appearance. Hundreds of separate cutouts were required for this job.

VENEER. Few people can afford furniture made of solid cabinet woods such as walnut, mahogany, bird's-eye maple, or satinwood. So cheaper woods are used, upon which extremely thin sheets of the more expensive woods are glued under pressure. A single tree might yield only 500 board

feet of lumber, whereas that same tree would yield 10,000 square feet of thinly-sliced veneer. Furthermore, veneering permits harmonious and balanced designs, impossible with solid lumber. Consecutive slices from the same log or burl may be placed side by side, thus repeating the grain pattern. Inlays are easily made, combining as many as three or four different kinds of rare woods. Plywoods used for paneling or furniture making are often furnished on one side with a decorative veneer (see Plywood).

VENEZUELA'S PLAINS and Cloud-Topped MOUNTAINS

VENEZUELA (*ven-ě-zwě-lá*), UNITED STATES OF. Its commanding position on the north coast of South America and its immense petroleum deposits combine to give Venezuela great advantages for world trade. It fronts the Caribbean Sea and the Atlantic for about 800 miles and its much indented coast line of 1,900 miles has several good harbors. In recent years it has been one of the three leading producers of petroleum, but its other resources of minerals, forest products, and agricultural products are still slightly developed in comparison with their possibilities. Economic progress has been retarded by the hot climate of much of the country, by difficulties of transportation, and by frequent political disturbances.

The Land and the Climate

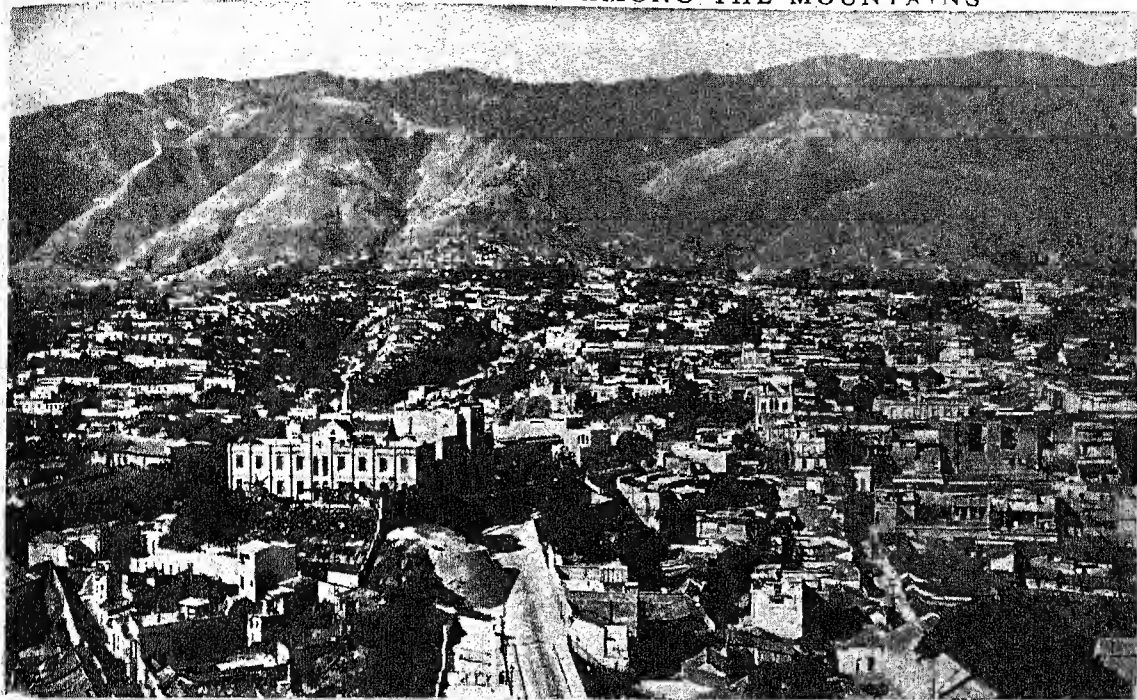
Lying just north of the Equator, Venezuela is a land of dense tropical forests, low grassy plains, and mountains. On the coast and in the interior lowlands it is intensely hot, except as the heat is modified by the trade winds. The climate becomes cooler as one

ascends from sea level. At altitudes from 2,000 to 7,000 feet it is cool enough to be healthful and agreeable. On the high mountain tops arctic cold prevails, though no part of the country is more than 13 degrees from the Equator.

Venezuela's area, which is officially estimated at 352,170 square miles, is somewhat larger than that of Texas and Oklahoma combined. There are four natural regions. The Guiana Highland in the south and east occupies about half the country. Heavily forested and largely unexplored, it consists of plateaus broken by chains of mountains with peaks somewhat more than 8,000 feet high. It is inhabited only by scattered tribes of Indians.

Through the center of the land are broad, low plains, or *llanos*, bordering the Orinoco River, which flows eastward across the country to the Atlantic. Wet and marshy in the rainy season and brown and burned in the dry season, the *llanos* cover about a third of Venezuela's area and extend into Colombia. Decades ago

CARÁCAS PERCHED HIGH AMONG THE MOUNTAINS



One of the oldest American cities, Venezuela's attractive capital was founded in 1567 under the name "Santiago de León de Carácas." Twice in its history it was destroyed by foreign troops, and in 1812 it was damaged by an earthquake that killed 12,000 people.

large herds of cattle roamed the plains and the *llaneros* (cowboys) rivaled in skill and hardiness the *gauchos* of Argentina and the cowboys of the United States. But the *llaneros* nearly disappeared in the War of Independence and later civil wars, and the herds are now small. The establishment of modern refrigerating plants in this region has, however, given an impetus to raising cattle for the export meat trade; and with irrigation and improved transportation the plains may become a major source of wealth.

The third region, in the north and northwest, is mountainous. At elevations up to 5,000 feet, coffee, the principal crop for export, cacao, and other agricultural products are grown; and here, because of its healthful climate, most of the white people live. The mountains are the Cordillera de Merida, a branch of the Andes which extends northeast into Venezuela from Colombia. It continues along the north coast in broken ranges known as the Maritime Andes or the Caribbean Hills. The Cordillera de Merida has numerous snow-capped peaks more than 15,000 feet high, but the coastal ranges are much lower.

West of the Cordillera de Merida, in the northwest corner of the country, is a hot, swampy plain surrounding Lake Maracaibo—the fourth geographic region. Since development of the petroleum industry, thriving towns have sprung up along the lake shore, replacing the Indian fishing villages built on piles, which gave Venezuela its name, "Little Venice."

The Orinoco River, 1,600 miles long, and its tributaries drain about four-fifths of the country. It is the

third greatest river system in South America. The Orinoco, the gateway to the llanos, is navigable for small ocean-going steamships as far as Ciudad Bolívar, 260 miles from the sea (*see* Orinoco River).

Harbors, Ports, and Cities

There are good natural harbors near Barcelona, where a gap in the coast ranges provides a gateway to the interior; and at Puerto Cabello, at the entrance to a rich farming valley with Valencia as its chief city. The Gulf of Maracaibo, or Venezuela, the outlet of Lake Maracaibo, provides a shallower harbor for the port of Maracaibo. This, since the rise of the oil industry, is the largest shipping center. La Guaira, near the center of the north coast, is the port of entry for Carácas, the nation's capital and largest city. La Guaira has no natural harbor but its wharves and anchorages are protected by a breakwater.

Carácas lies above La Guaira in a valley of the Maritime Andes, 3,000 feet above sea level. It is connected with the port by a railway which twists in sharp curves up a wall of granite nearly a mile high, and by a tortuous motor highway cut in the rock. The air-line distance is only six miles, but railway and road cover three times this distance.

The birthplace of Simón Bolívar, the liberator of South America, Carácas was the first spot on the continent to free itself from the Spanish yoke. It is a beautiful city, with fine public buildings. Its life centers about the Plaza de Bolívar, one of the many great squares. Facing the Plaza are the cathedral (built in 1614), the archbishop's residence, the post

office, and the famous "Yellow House," in which the president of the republic lives.

Industry and Transportation

Coffee, grown on both large and small plantations, is the leading agricultural product and chief export crop. Cacao is also an important export. Sugar cane, tobacco, cotton, corn, beans, and fruits are raised for home use. Wheat, rice, oats, and potatoes are grown and are also imported. The forests contain valuable woods. Rubber is produced but the output is small because of transportation difficulties and the competition of Far Eastern plantations. Since the early 1920's, petroleum has been the mainstay of Venezuela's economic system. It accounts for nearly nine-tenths of the country's exports in value. The rich Lake Maracaibo region is the chief producer. Other mineral resources include gold, silver, diamonds, iron, coal, manganese, and asphalt, but none is mined in important quantities.

Lack of raw materials handicaps manufacturing. The development of mining and agriculture awaits better transportation. There is less than 700 miles of railway, about half of which is owned by foreigners. An extensive program of highway construction, however, has brought almost 6,000 miles of good roads. There is an air-line connection with the United States. The Orinoco system furnishes most of the 6,500 miles of navigable rivers.

The People and Their Government

With a population of about 3,500,000, Venezuela has an average population density of fewer than ten to the square mile—another handicap to the country's development. The great majority of the people are *mestizos*, of mixed Indian and white blood. The pure whites number only about 10 per cent and the Negroes and Indians comprise about 20 per cent. Almost three-

VENEZUELA AND ITS LIBERATOR



The statue of Simón Bolívar pictured above stands in his birthplace, Caracas. Notice on the map of Venezuela that most of the cities are in the mountainous region of the north and west.

fourths of the people cannot read or write. Elementary education is free and compulsory, and the government is spending large sums in a campaign to wipe out illiteracy. Most of the people belong to the Roman Catholic church.

The government is a federal republic. According to the constitution of 1936, the president is elected by congress for a five-year term, and may not succeed himself. Congress is composed of a senate, elected by the state legislatures, and a chamber of deputies, elected by the municipal councils. The state legislatures and municipal councils are elected by the vote of literate males over 21 years of age.

Venezuela's Troubled History

The Venezuelan coast was first sighted by Columbus during his third voyage in 1498. For three centuries the people were under Spanish rule. In 1811 revolutionary forces, led by Francisco Miranda, declared a republic, but the revolution was soon crushed and Miranda imprisoned. The struggle continued under the leadership of Simón Bolívar, who finally defeated the Spanish forces in 1819. For a few years Venezuela was part of the republic of Greater Colombia,

but in 1830 it seceded and became an independent republic. After that the country was ruled by a series of dictators, including the notorious Guzman Blanco, 1870-1889, Cipriano Castro, 1899-1908, and Gen. Juan Vicente Gomez, 1909-1935.

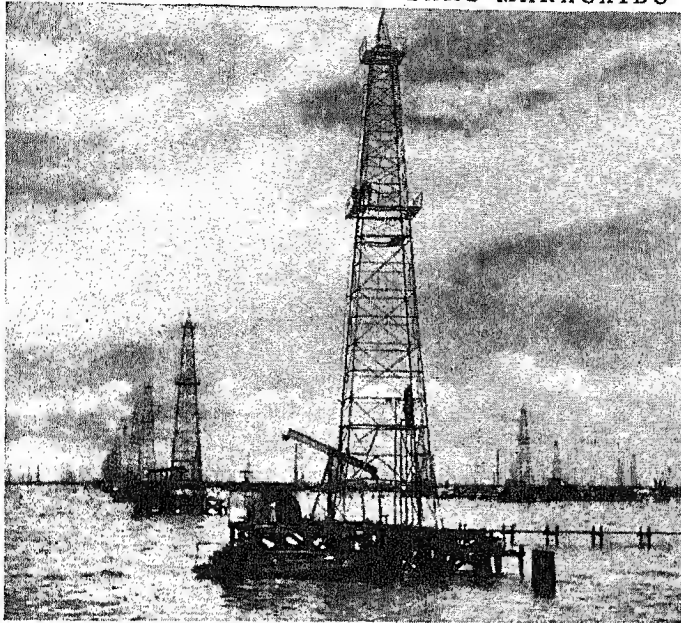
Foreign Relations

Boundary disputes with British Guiana became a head in 1895, and the threat of Great Britain to use force called forth President Cleveland's famous message to the Congress of the United States. In this he stated, in effect, that any attempt by Great Britain to enforce its claims without recourse to arbitration would be considered a violation of the Monroe Doc-

trine and might lead to war with the United States. The dispute between Great Britain and Venezuela was then arranged by arbitration. A few years later (1903) Castro's overbearing violation of foreign rights led Great Britain, Germany, and Italy to declare a blockade of Venezuelan ports. When President Theodore Roosevelt protested that this step also violated the Monroe Doctrine, Great Britain and Italy at once consented to refer the dispute to arbitration. Germany declined to arbitrate and Roosevelt

announced his intention of sending an American fleet to the Caribbean, which at once brought Germany to terms. Castro plunged his country into new difficulties in 1908, and the offended nations practically paralyzed Venezuelan commerce by instituting a quar-

THE RICH OIL FIELD OF LAKE MARACAIBO



In 1922, when a well spouted petroleum sixty feet into the air for nine days, the Lake Maracaibo basin began to produce wealth for Venezuela. Derricks and pumps dot the lake, bringing up the oil from under its surface. The industry was developed by United States, English, and Dutch interests.

three-year plan to increase foreign trade, encourage immigration, and improve health, housing, and education. (See also Latin America; Latin American Literature; South America; and Venezuela in FACT-INDEX at the end of this volume.)

antine against the nation's ports. In the midst of these troubles Castro fled to Europe. Gen. Juan Vicente Gomez then became president. Gomez built roads and schools, developed the country's oil resources, with the aid of foreign capital, and paid off the national debt. But his tyrannical dictatorship made him so feared and hated that his death in 1935 was greeted with popular rejoicing. In 1936 Gen. López Contreras was elected president. In 1938 President Contreras started a

The QUEEN CITY of the ADRIATIC

Beautiful Venice, Its Dramatic Origin and Its Picturesque Situation on the Islands of the Sea—How It Rose to Opulence and Power

VENICE, ITALY. When the hordes of barbarian invaders swept over Italy in the 5th century, many of the inhabitants along the northwestern corner of the Adriatic Sea sought refuge on the low mud islands, situated some miles off the shore between the mouths of the rivers known as the Piave and the Adige. Upon this unpromising ground were laid the foundations for one of the most remarkable, one of the richest, and one of the most beautiful cities the world has ever known—Venice, the "Mistress of the Adriatic."

Venice today rests like a gorgeous seabird in a dream of silence upon its "hundred isles." No elang of traffic on noisy streets can disturb its quiet of centuries, broken only by the sound of water lapping at the foundations of ancient palaces or the romantic songs and cries of boatmen driving their black gondolas through the city's endless canals. Almost the sole intrusion of the noise of the outer world is the distant whistle of the trains as they cross the long bridge from the mainland, or the occasional chug of a motor-boat.

From the railway station the Grand Canal, describing a big letter "S" through the middle of the

city to the southeast, extends to the great Doge's Palace on the Piazza of St. Mark. Just as the canal is the main thoroughfare of Venice, so the Piazza of St. Mark's, to which it leads, is the center of the city's historical and artistic interest.

The Doge's Palace, where the rulers of Venice formerly held their court, was begun in 1301, and the work of building continued for more than two centuries. The result is one of the most magnificent examples of Italian architecture and one of the most picturesque buildings of the world.

Here also, overshadowing all else on the piazza, is the world-famous Cathedral of St. Mark (San Marco), which stands immediately north of the Doge's Palace. No other building exists that can be compared to it for its amazing architectural design and its ornamentation and wealth of color. In general it has a Byzantine character, with its five great oriental domes, and resembles the former church (now museum) of Santa Sophia at Constantinople. It is dedicated to the evangelist of the New Testament, who became the patron saint of Venice.

THE BEAUTIFUL CITY BORN OF THE SEA



"Venice is a city—for centuries a widespread empire—that has grown up on the dust of the Alps, brought down by the rivers and cast into the sea. Into these islands formed in the lagoons of the Adriatic, men drove huge piles, upon which they built magnificent palaces. They went on building until the islands were crowded; and this wonder-city, rising from the sea, served as a central magnet, attracting to itself great dreamers and workers from the cities around." The soaring spire topped with a winged figure of an angel is the bell tower, or Campanile, overshadowing the domes of St. Mark's Cathedral. Between the cathedral and the water front is the great Doge's Palace. To the left of the palace, two ancient columns of Egyptian granite, one surmounted by the famous bronze Lion of St. Mark, stand at the entrance to the Piazzetta which leads to the Piazza San Marco. The entrance to the Grand Canal is beyond the range of the picture to the left.

St. Marks as it stands today was begun in the 11th century, and all the wealth of the East was drawn upon to add to its beauty. Venetian merchants trading as far away as the Indies brought back rare stones and marbles to add to it. Columns taken from the ruins of Mohammedan temples and Byzantine basilicas are incorporated in the structure. Everywhere, inside and out, are rare mosaics. "You see nothing, you tread on nothing but what is precious," wrote an early traveler in describing St. Marks.

Over the main entrance to the cathedral are the four famous bronze horses which once stood on Nero's arch in Rome, were later carried to Constantinople by Constantine, and taken from there by the conquering Venetians in 1204. Napoleon took these horses to Paris in 1797, but they were restored to Venice after his fall. (For illustration, see Italy.)

Near St. Marks is the great bell tower or campanile—now rebuilt on its former pattern—which collapsed in 1902.

The foundations of Venice rest on wooden piles driven into the mud islands of the lagoons. There are about 16,000 buildings, around and between which flow some 170 canals, crossed by more than 400 bridges. Two of these bridges are world famous—the "Rialto" and the "Bridge of Sighs." The former, which is mentioned in Shakespeare's 'Merchant of Venice',

crosses the Grand Canal and is lined with shops. The latter leads from the upper story of the Doge's Palace to the state prison, where in the bygone days of Venice's power so many political offenders went to secret and cruel deaths.

Venice today has 70 churches and innumerable old palaces, each a delight to the artist and architect, for the old-time Venetians developed from their cosmopolitan experience an architecture of their own. In many respects the city is more Greek than Italian, due to its thousand years' connection with the Byzantine Empire. The libraries of Venice contain many rare manuscripts, including the early records of the city, priceless to students of history.

The harbor of Venice is separated from the sea by a long sandbank called the "Lido." It is protected from the waves by a sea-wall and has become a fashionable bathing beach. The entrance to the port is strongly fortified, and two moles stretch out into the Adriatic to prevent its filling up with the wash of sea currents.

Venice is the one part of the Roman Empire in the West which never became part of any of the old Teutonic empires. For centuries it was considered part of the Byzantine or Eastern Roman Empire, but in reality it early became a self-governing republic, under its own *doge* or duke. In the time of the Crusades Venice developed a great trade in spices, perfumes,

sugar, silks, and other goods coming from the East; and for several centuries Venice and Genoa controlled the sea routes of the Eastern Mediterranean.

The Fourth Crusade by the persuasions of the Venetians, under their blind old doge Dandolo, was turned against the Christian city of Constantinople. Its fall, in 1204, gave the Crusaders rich loot; Venice received as her share of the broken empire the Greek islands in the Aegean and Ionian seas, a portion of Constantinople itself, and the entrance to the Black Sea. Although Constantinople soon recovered its independence, the Peloponnesus of Greece and many of the Greek islands were ruled by Venice until 1718.

In the days of her power the rich merchants of Venice decided to exclude the people from any part in the government and formed an exclusive aristocracy (1296), which should elect the council and appoint the doge and have full powers in the state. Numerous revolts were put down, and the city became a close oligarchy. The cruelties of the famous Council of Ten made its tyrannical rule notorious.

Wars and Conquests

A long series of fierce wars with Genoa over the Eastern trade rights ended in 1380, when the Venetians trapped the Genoese fleet inside the Chioggia lagoons, south of the city, and forced its surrender.

A series of conquests on the Italian mainland followed, which extended Venetian territory from the River Po to the Alps, and westward almost to Milan.

The city of the doges was now at the height of its power, but a decline speedily set in. First the Turks, who had captured Constantinople in 1453, began to strip Venice little by little of her Greek possessions. In 1488 the discovery of the sea route to the Indies around the Cape of Good Hope destroyed the value of the Mediterranean routes, and brought the riches of the Orient to the Portuguese, the Dutch, and the British. Finally a combination of the Italian and European powers in the league of Cambrai wrested from Venice almost all her territory on the mainland of Italy (1508). It was during this period, however, that Venice reached her highest point of artistic development and gave to the world the famous Venetian school of painters, headed by the immortal Titian.

The last doge abdicated in 1797, to make way for the rule of Napoleon. After the fall of the latter, Venice passed into Austrian hands. Venice took a leading part in the unsuccessful revolution of 1848 against Austrian rule in Italy. It was finally given up by Austria to the new kingdom of Italy in 1866.

The opening of the Suez Canal in 1869 gave the city a direct route from central Europe to the East, and Venice again became an important trade port. Its commerce increased steadily thereafter, and in 1917 plans were made for building a new port on the mainland, communicating with the near-by railroad center of Mestre. Development of the new port of Marghera and of adjoining industrial areas to the north, west, and south was carried forward rapidly by the Mussolini government. Population, about 260,000.

VENIZELOS, ELEUTHERIOS (1864-1936). "I have always told my fellow-countrymen the truth and the whole truth, and I have always been quite prepared to lay down my power without regret." This, in his own words, was the guiding principle of Venizelos, the great Liberal leader of Greece, and one of the most influential statesmen of modern times.

Of Greek ancestry, he was born near Canea in Crete, while that island was still suffering under the oppression of Turkish rule, and was given the name of Eleutherios, which means "the Deliverer." He attended school in his early years at Syra and later at Canea, where he stood out as a leader among his fellow-pupils.

Frees Crete from Turkish Rule

When his school days were over his father expected him to go into business with him, although the youth's own desire was to study law. Greece would have lost a great statesman had it not been for the Greek consul-general at Canea, who urged the father to send his son to the University of Athens. When he returned to his native Crete as a lawyer in 1886, the desire for freedom and the ardent Greek patriotism that were in his very blood had become the ruling passions of his life. "I became a revolutionary by profession and a lawyer at intervals," he said in giving an account of his life in Crete. He became the leader of his people in the movement which finally resulted, first in liberating Crete from Turkish rule (1897-99), and later in uniting it with Greece (1912).

In 1909, when affairs in Greece were in confusion and a strong hand was needed to keep the government from going to pieces, the king appealed to him to save Greece as he had saved Crete. Venizelos, who became premier in 1910, brought about a revision of the constitution, reformed the army and navy, restored national unity, strengthened the throne, and earned the title of "the savior of Greece." He piloted the country successfully through the Balkan Wars of 1912-13, which resulted in great territorial acquisitions to the north of Greece (see Balkan Peninsula).

His Part in the World War

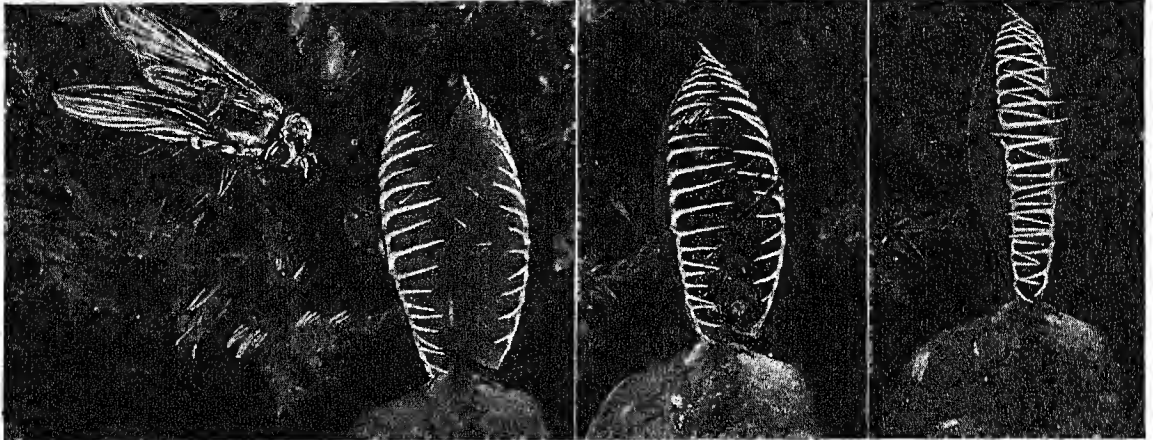
The World War of 1914-18 brought another crisis in which Venizelos was to play a decisive part. From the beginning he favored the cause of the Allies and urged King Constantine to join them. But the king, whose wife was a sister of the German Kaiser, refused to take part against Germany, even though Greece was bound by treaty to come to the aid of Serbia. Venizelos resigned, but the majority of the people were with him, and the king was forced to recall him. When Venizelos found that it was impossible to reach an agreement because of the unconstitutional conduct of the king and court party, he again resigned. Setting up a provisional government at Saloniki, he mobilized troops to aid the cause of the Allies. At last in 1917 Constantine was forced to abdicate in favor of his son Alexander. Venizelos again became premier, and was able to carry out his plans for the effective cooperation of Greece with the Allies (see Greece).

At the Peace Conference at Paris, Venizelos, as the principal delegate of Greece, exerted an influence out of all proportion to the country which he represented, and was able to realize his dream of uniting the scattered Greeks under the rule of the mother country. Turkey was forced to give up Thrace almost to the gates of Constantinople, together with important

into a steel trap, so to speak, because it snaps shut on unwary insects in exactly the same way that a steel trap works.

The Venus's fly-trap is found only in sandy savannas near Wilmington, N.C. The leaves are in rosettes and have broad stems. Each leaf ends in two lobes that are hinged at the midrib; each lobe has spines

A NATURAL HISTORY DRAMA IN THREE ACTS



Act 1: The blundering fly approaches the Venus's Fly-Trap, whose favorite food is an insect. Act 2: Snap! The lobes of the leaf have come together like the jaws of a steel trap—though not quite so rapidly—and, struggle as it may, the fly's doom is sealed. Act 3: The leaf settles down to the long task of digestion, which takes it several days.

islands in the Aegean and a Greek protectorate was obtained over Smyrna in Asia Minor.

But almost in the hour of his greatest triumph there came a reaction against Venizelos. The Greek people were weary of war and confused by royalist propaganda; and when King Alexander died in December 1920, they restored the deposed King Constantine in defiance of the Allies, and defeated Venizelos in the elections. In the next few years much of the territory he had won for his country was again lost to Turkey.

When King George II, who had succeeded Constantine, was driven out in 1924, Venizelos returned and took an active part in forming the new republic. Illness, however, soon compelled his retirement. Four years later he was recalled to the premiership, but in 1932 he was again forced out, largely because of his failure to avert a financial crisis. In 1935 he headed an armed revolt against the government. This was speedily crushed, and the aged Venizelos fled into exile, under sentence of death. Although he opposed the restoration of the monarchy, he was pardoned by King George, who returned to the throne in December, 1935. He remained in Paris, however, until his death a few months later.

VENUS. Originally a goddess of beauty and growth in nature, the Roman goddess Venus became identified with Aphrodite, the Greek goddess of love (see Aphrodite). She was represented as the highest ideal of feminine beauty. Venus was especially honored at Rome, as Romulus, the legendary founder of the city, was believed to have been descended from her son, the hero Aeneas. The planet Venus is named after the goddess. (See Aeneas; Romulus; Planets.)

VENUS'S FLY-TRAP. Of all the insect-eating plants, the Venus's fly-trap is perhaps the most remarkable. This is a plant which has turned itself

along its margin, and its upper surface is covered with glands secreting a purplish juice. Among these glands on each lobe are three bristles, set in a triangle, each bristle hinged at the base and very sensitive. The moment an insect touches a bristle, the leaf lobes close up suddenly around it, the spines along the edges interlocking to hold the prisoner fast. The glands secrete a digestive fluid and absorb all the nitrogenous matter in the insect. It takes a leaf many days to digest one insect, and the same leaf is rarely able to digest more than two or three before it dies. Scientific name, *Dionaea muscipula*. (See also Pitcher Plants; Sundew.)

VERA CRUZ (və'ra kruz), Mexico. The principal port of Mexico today, as it has been ever since Cortez landed there in 1519, is situated on the Gulf of Mexico directly east of the capital, Mexico City. Cortez named it *La Villa Rica de Vera Cruz*—"The Rich City of the True Cross"; but for centuries it was known as "the City of the Dead" because of the plagues of yellow fever and malaria which visited it. Recently, however, it has been made a clean and healthful town, with the filling in of the surrounding swamps that bred disease-carrying mosquitoes, and the construction of an excellent sewerage and water supply system. The harbor, too, which used to be dreaded by vessels because it afforded no protection from the severe "northers" which sweep the Gulf, has been improved at great cost.

The streets of the city of Vera Cruz are only a few feet above sea-level. For nearly a mile the city encircles the bay, fringed by an attractive bathing

beach; and behind it stretches a sandy dune country. The streets, though narrow, are straight and clean, lined by low buildings tinted in red, yellow, blue, and green, with here and there public buildings of recent construction. Four railways and an automobile highway give the city access to the interior, and one-half the foreign sea trade of the entire country passes through its harbor. Vera Cruz is also an important manufacturing city, known especially for its cigars.

In the 17th and 18th centuries Vera Cruz was twice pillaged by privateers; their expeditions led to the construction of the celebrated Fort San Juan de Ulua on one of the little islands of the harbor. The French held the port in 1838, and again in 1861. In 1847 United States troops under Gen. Winfield Scott captured it in the Mexican War. In 1914, following the Tampico incident in which American sailors were arrested, United States Marines occupied the city for a brief period. Population, about 70,000.

VERB. Verbs are *action* words—as opposed to nouns, which are *name* words. As the noun is the important element of the subject of a sentence, so the verb is the important element of the predicate (see Sentence). . . The noun names the thing or person we are talking about; the verb asserts or predicates something about the subject. Since the verb is the most vigorous and vital part of the sentence, the part that gives life to it and converts an incomplete group of words into a sentence, the earliest grammarians called it *verbum*, which is the Latin word meaning “word.” That is, the verb is *the* word, without which no grouping of the other parts of speech would make a sentence. *Dogs* and *swiftly* by themselves tell us nothing. Put in the verb *run*, and you get a complete and definite statement.

Most verbs are action verbs, but there is one very important verb that merely expresses existence and links the subject with the rest of the predicate. This is the verb *be*, with all its various forms, as in the sentence “The orange *is* yellow.” Here *is* merely links the subject with the predicate adjective *yellow*. For this reason *be* and other verbs which perform a similar duty, like *become*, *appear*, *seem*, *remain*, etc., are called *copulative* or *linking* verbs. Such verbs are usually followed by a predicate noun, pronoun, or adjective to complete their meaning.

A verb that expresses an act involving something besides the actor is called a *transitive* verb. A verb that does not express an act involving something besides the actor is called an *intransitive* verb. In the sentence “She *stood* still,” the verb *stood* expresses the act of standing, which does not involve anything besides the actor, the girl. In the sentence, “She *tore* the letter,” the verb *tore* expresses an action which involves the letter as well as the actor, the girl. A transitive verb must be followed by some word or group of words which stand for the other thing involved in the act besides the actor. This word or group of words is called the *object*. In the sentence above, the word *letter* is the object.

By various changes in form, and by the help of certain other verbs called *auxiliary* (“helping”) verbs, verbs are able to express many ideas in addition to their own meaning. For example, the form *am* tells us that the speaker is talking about himself; *buys* tells us that the subject is in the third person (for person, see Pronouns); *will go* tells us that the action is to take place in the future; *leaped* tells us that the action has already taken place. Such changes or *inflections* in the form of verbs are called *conjugation* and to conjugate a verb is to name in order all its forms.

The various ideas which may thus be expressed by merely changing the form of a verb or using an auxiliary with it are five: person, number, tense (time), mode, and voice. By *person*, it tells us whether the subject is speaking, spoken to, or spoken of. By *number*, it tells us whether the subject represents one or more than one. *Tense* tells us the time of the action. *Mode* (sometimes called *mood*) is the manner of assertion, that is, whether the action is asserted as an actual fact, as doubtful, as desired, or as commanded, etc. *Voice* is the quality that denotes whether the subject is acting or is acted upon.

Good Verbs Must Agree with Their Neighbors

A verb is said to agree in person and number with its subject. In most English verbs, however, there is only one change in form made to show change in person and number; namely, the addition of *s* to the root or simplest form of the verb to make the third person singular of the present indicative. Examples are *take, takes, find, finds*. The verb *to be* is the only one that makes more than this change to show person and number. Its present tense is as follows:

	SINGULAR	PLURAL
First person:	<i>I am</i>	<i>We are</i>
Second person:	<i>You are</i>	<i>You are</i>
Third person:	<i>He, she, or it is</i>	<i>They are</i>

In the past tense this verb has two forms: *was*, singular, and *were*, plural. But *you were* is used for both singular and plural.

In English the verb has six tenses: *present*—denoting action going on in the present (*I write* or *am writing*); *past*, denoting action in the past (*I wrote* or *was writing*); *future*, denoting action about to take place (*I shall go*); *present perfect*, denoting action completed or perfected just before the present (*I have spoken*); *past perfect*, denoting action completed in the past (*I had gone*); *future perfect*—denoting action that will have been completed at some future time (*I shall have gone*).

To show the attitude of the speaker toward his assertion there are three modes. The *indicative* mode is used to state something as a fact; the *imperative* mode is used to express a command or an entreaty; the *subjunctive* mode is used to express something as wished, possible, or merely thought of. In English the indicative, imperative, and subjunctive forms are for the most part alike. The subjunctive mode omits the ending *s*, “Long *live* the king!” The verb *to be*, however, has the subjunctive form *be* for all persons and numbers in the present tense, and the form *were*

for all persons and numbers in the past tense. Familiar examples are: "if it *be* I" and "if I *were* you." The subjunctive mode of the verb is little used in spoken English today. Instead we commonly use phrases formed with certain auxiliary verbs; as *may rain*, *might have rained*, if it *should rain*.

Difference between Acting and Being Acted Upon

A verb that represents its subject as acting is said to be in the active voice; as "I *tore* the letter." One that represents its subject as being acted upon is said to be in the passive voice; as, "The letter *was torn*." The passive forms are made by combining the six tenses of the verb *to be* with the past participle of the verb conjugated; as, I *am attacked* (present); I *was attacked* (past), etc.

In addition to the various forms of the verb which we have discussed, there are two others that are usually called *verbals*, though they are sometimes classed as modes. These forms are the *infinitive* and the *participle*. They are verb forms in that they both may take an object, and the infinitive may take a subject as well; but they resemble nouns, adjectives, and adverbs, in that they cannot of themselves form a predicate. In general, they are equivalent to condensed clauses and may be used, like clauses, with the functions of an adjective, an adverb, or a noun; for example, *To err* is human (infinitive used as a noun); He came to *see* me (infinitive used as an adverb); *Seeing* is *believing* (participle used as a noun); *Fearing* detection, he fled (participle used as an adverb); the *blushing* rose (participle used as an adjective). Both infinitives and participles have voice and tense, but neither person nor number. The participle occurs in the present, past, and perfect tenses; the infinitive in only the present and perfect.

Regularity and Irregularity among Verbs

According to the way they form their past indicative and past participle, verbs are classified as *regular* and *irregular* or *weak* and *strong*. A verb that forms its past tense and past participle by the addition of *ed*, *d*, or *t* is of the regular or weak conjugation. This conjugation includes by far the greater number of English verbs. Examples are: *lay, laid, laid; keep, kept, kept; walk, walked, walked*. To the weak conjugation also belong all verbs whose forms are alike throughout; as *set, set, set*. Verbs that do not add a *d* or *t* sound to form the past tense and past participle are generally of the irregular or strong conjugation; as *see, saw, seen; do, did, done; fight, fought, fought*. Strong verbs generally change the root vowel in the past tense; but many weak verbs also change. The verb *to be* is irregular, formed from three different roots; its forms are *be, am, is, are, was, were, being, been*. A few verbs used as auxiliaries are defective, which means that they are used in only one or two forms; as, *ought, must, will*.

Some of the commonest errors in the use of verbs are illustrated in the following sentences:

Lack of agreement between subject and verb—"We *was* there" for "We *were* there."

Misuse of the present for the past—"I *come* here a year ago" for "I *came* here a year ago"; "I *give* him a quarter yesterday" for "I *gave* him a quarter yesterday."

Confusion between the participle and the past tense—"I *seen* it" for "I *saw* it"; "I *have went*" for "I *have gone*"; "I *have wrote*" for "I *have written*."

Incorrect formation of tense—"I *knowed* the lesson" for "I *knew* the lesson"; "He *et* the apple" for "He *ate* the apple."

Confusion between verbs similar in meaning—"We *laid* down on the beach" for "We *lay* down on the beach"; "Please *set* down" for "Please *sit* down"; "That *learned* me a lesson" for "That *taught* me a lesson."

VERDI (*věrdě*), GIUSEPPE (1813-1901). Everyone knows the "Anvil Chorus" from 'Il Trovatore' of Verdi. Probably no opera score has furnished more popular numbers than this chorus and the melodic "Ah, I have sighed to rest me," from the same composition. The man who wrote these and countless other world-famous tunes was born in a little village in Italy, in the valley of the River Po, not far from Parma. At ten years of age he became organist in the village church. Later he studied music in Milan, and in 1838, having married, he took up his residence there. A period of struggle followed, and just as Verdi had established a reputation and realized the first financial benefits from his compositions, his wife and two children died within a few weeks of one another. Some time elapsed before Verdi's next opera was brought out, but extraordinary success crowned its production. With 'Ernani' in 1844, his fame and fortune were secure. Soon after this time, the right to publish one opera brought him \$4,000. Later, in the case of his opera 'Aida', he received \$20,000 for his first night's performance.

Verdi's last opera, 'Falstaff', was produced just before his 80th birthday. Thousands of music lovers journeyed to Milan from all parts of Italy for its first performance, and the ovation the old composer received has scarcely been equaled in musical history.

Of his 30 operas, 'Rigoletto' and 'Il Trovatore' are most widely known; but his 'Aida', 'Otello', and 'Falstaff' possess a much greater degree of musicianship and show the influence of Wagner. Of his church music, the 'Manzoni Requiem' and 'Stabat Mater' express in the highest degree the imaginative power and musical genius of the composer.

VERDUN (*věrdūn*), FRANCE. When the German armies swept over Belgium and into France in August and September 1914, all the great fortified cities in their path fell quickly before their heavy guns—all except Verdun on the Meuse River, 23 miles south of the Franco-Belgian frontier and about the same distance west of the border of Alsace-Lorraine, which in those days belonged to Germany.

Here the invaders' lines were halted and bent into a great inverted U, whose two prongs reached southward more than 20 miles on each side of Verdun. Even after the German armies to the west had been stopped and thrown back in the Battle of the Marne, the German Crown Prince drove in a wedge east of the city and on September 12 captured St. Mihiel—

a strong position which was held by the enemy until United States troops recaptured it, four years later to the day. But in spite of this wedge the French defenders held their ground with stubborn courage.

A year and five months passed. Then the German general staff, confident of its mastery on the eastern front, determined upon a crushing blow at France before Great Britain's newly trained armies could take the field.

The spot chosen was Verdun, because it was like a spear-head thrust in the side of the German battle-line, a constant menace and a constant challenge. The Crown Prince was put in command under the guidance of strong advisers. An unheard-of number of guns was concentrated upon the French trenches which defended the slopes of the Verdun plateau. A quarter of a million Germans were massed for the attack.

On Feb. 21, 1916, the storm broke. A torrent of shells poured upon the French positions, blotting out the first and second lines of defense. Clumps of trees which sheltered French artillery were wiped out of existence in a few minutes. The ground was ripped and torn as if by an earthquake. Then through the heavy fog the famous German "shock troops" advanced to the charge. The French who had survived that hail of metal fought stubbornly and went down. Moving forward with caution and mechanical regularity, the Germans took line after line. In four days they had advanced four miles, reaching the first of the outlying forts which encircled Verdun. All day on February 25 the attackers, wave upon wave, surged up the snow-covered slope of Douaumont Hill, only to break and melt away under the murderous fire of French machine guns and shrapnel. Then towards evening, while Emperor William himself looked on from a distant hill, the crack 24th Regiment of Brandenburgians went forward in a supreme assault and carried the crest.

At this juncture arrived Gen. Philippe Pétain, and that night there was whispered down the weary and broken lines of troops the magic watchword which

was soon to send a thrill of pride through the heart of every Frenchman and fix the eyes of the entire world on those bloody hills above the Meuse. "They shall not pass!" said Pétain. "They shall not pass!" repeated every shivering poilu.

repeated every shivering poilu.

The next morning the French in an impetuous charge drove the Germans back from Douaumont Hill. For four days the battle raged, until, on March 1, the attack subsided.

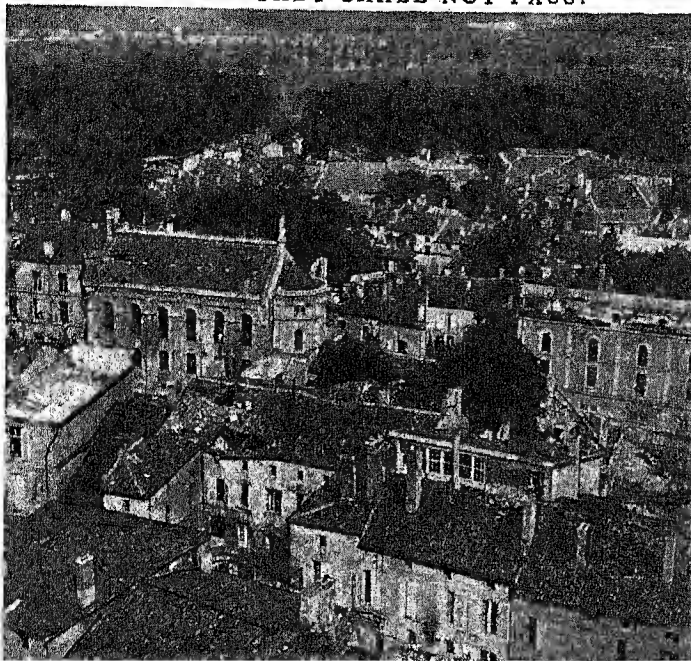
The second phase of the struggle opened on March 2 with an attack of redoubled fury on the French positions west of the Meuse. For six weeks munitions and lives were recklessly and vainly thrown away in an effort to take Dead Man's Hill, which on this side was the key to Verdun. Then, after a month

of rest, the Germans opened a third desperate attack from all sides at once. This time Dead Man's Hill was taken as well as Fort Douaumont and Fort Vaux. Throughout the month of June the struggle raged.

But still Verdun held fast. By July 1 the battle there had virtually come to an end, and the German General Staff was compelled to turn its attention to the north, where the British were launching their first great drive on the Somme River. This disastrous failure at Verdun cost the German army about 500,000 men—killed, wounded, and prisoners. But, for the victorious French and their allies, it was a turning point in the war, inspiring them with a new will to win. After the war, Verdun was rebuilt to form part of the northwest end of the new Maginot line of forts facing Germany. But in the German drive against France in 1940, when French resistance collapsed, city and forts were taken in a single day, June 15.

Verdun is an old city, dating back to Roman days. The most notable event in its earlier history was the Partition of Verdun, a treaty signed there in 843 between the sons of Louis the Pious, dividing the former empire of Charlemagne. From this division grew the countries of France and Germany. Their age-long rivalry over the "middle strip," which included Lorraine, was one of the factors in the World War of 1914-1918. Population, about 20,000.

VERDUN—"THEY SHALL NOT PASS!"



Hundreds of thousands of lives were sacrificed by the Germans in 1916 in their vain endeavor to take this historic city, which was long the farthest outpost of the French on the northeast front. A glance at almost any building will show shell-holes and other damage caused during the terrific fighting.

VERGIL (70-19 B.C.). The greatest of the Roman poets, and the one who gave supreme literary expression to the highest qualities of Roman genius, Publius Vergilius Maro was not a Roman by birth. His early home was on his father's farm in the village of Andes near Mantua in what was then the province of Cisalpine Gaul. His father was a small freeholder, who farmed his own land and prospered sufficiently to give his son the best education that the times provided. The young Vergil was sent to school at the neighboring town of Cremona and then to Milan. At the age of 17 he went to Rome, where he studied rhetoric and philosophy under the best masters of the day.

After the Civil War between Caesar and Pompey, which put an end to republicanism in Rome, Vergil's farm was among the estates confiscated. The loss, however, proved to be a blessing in disguise, for it brought him powerful friends who obtained another estate for him and introduced him into the intimate circle about Octavian, soon to become the Emperor Augustus. Chief of his friends and patrons was Maecenas, the great Home Minister of Augustus, and through his liberality Vergil was relieved of all material cares and was thus enabled to devote himself entirely to literature.

In the quiet years that he spent in the country he read and studied the Greek poets. Following Theocritus as a model, he wrote his 'Eclogues', pastoral poems in which he gave expression to his tender feel-

ings for the beauty of Italian scenes. At the suggestion of Maecenas he wrote a more serious and original work on the art of farming and the charms of country life, the 'Georgics', which established his fame as the foremost poet of his age. The year after they were published, he began his great epic, 'The Aeneid', taking as his hero the Trojan Aeneas, supposed to be the founder of the Latin nation, and thus celebrating the glory of Rome and the imperial family. He had devoted more than ten years to this work when, on a visit to Greece, he contracted a fever which proved fatal. On his deathbed he begged that the 'Aeneid' should be destroyed, saying that it still wanted three years' work to bring it to perfection. The command of Augustus alone prevented the carrying out of the poet's request and saved for the world one of its epic masterpieces.

The poem, published after Vergil's death, exercised a tremendous influence upon Latin literature, prose as well as poetry. Even the Christian church regarded him as divinely inspired, and thus his influence continued through the Middle Ages and into modern times. Dante revered him as his master and represented him as his guide in the 'Divine Comedy'. Chaucer, Spenser, Milton, and Tennyson owed much to him. The superstitious people of medieval times looked upon his tomb at Naples with religious veneration, and many stories arose which endowed Vergil with magical powers.

The "GREEN MOUNTAIN STATE" and its Rock-Ribbed Hills

VERMONT. When larger, richer states boast of their wealth in gushing oil-wells, their deep loamy soils, their thick seams of coal, or their great smoking cities, the tiny Green Mountain state—42nd in size and 45th in population in the United

States—points to its children as its greatest treasure.

Vermont's rugged hills and peaceful valleys are a last stronghold for that able resolute type, the rural New England Yankee, developed when Puritan colonists pitted their strength against the wilderness to carve out a new nation. The stanch character of these shrewd and thrifty people, hardly less firm than the state's far-famed granite and marble, has greatly influenced America. It has been said that Vermont counts more native sons in the nation's lists of notables than any other state, in proportion to population.

Famous Vermonters include two presidents of the United States, Chester A. Arthur and Calvin Coolidge; two naval heroes of the Spanish-American War, Admiral George Dewey and Admiral Charles E. Clark; such inventors as Thomas Davenport, with

Extent.—North to south, 158 miles; east to west, greatest width, 90 miles. Area, 9,609 square miles. Population (1940 census), 359,231.

Natural Features.—Mountain-ridged uplands with many deep valleys and small lakes and ponds. Principal ranges: Green Mountains (highest point, Mount Mansfield, 4,393 feet) and Taconic. Principal rivers: Missisquoi, Lamoille, Winooski, and Otter, draining into Lake Champlain on the western border; White, Passumpsic, and West, draining into the Connecticut River, which forms the eastern boundary. Mean annual temperature, 43°; mean annual precipitation, 38".

Products.—Hay, potatoes, maple sugar and syrup; cattle and dairy products; stone, granite, marble, slate, asbestos, talc, soapstone, lime; paper and pulp goods, lumber products, machinery, woollens, knitted goods, flour and mill products.

Cities.—Burlington (27,686), Rutland (17,082), Barre (10,909), Montpelier (capital, 8,006).

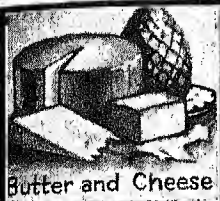
his electric motor; Silas Hawes, who patented the carpenter's square; and Samuel Morey, whose small crude steamboat moved on the Connecticut River in 1791. Prof. John Dewey, philosopher and educator, was born in Burlington, and Stephen A. Douglas at

Brandon; Horace Greeley learned his printer's trade in East Poultney, and William Lloyd Garrison published a short-lived newspaper in Bennington.

For decades the state's ambitious young men have been moving to regions where there were new lands to develop or wider opportunities in business and the professions. The absence of large manufacturing centers also limited foreign immigration. While the population of the United States multiplied more than 5½ times between 1850 and 1940, the population of Vermont increased by only one-seventh. French-Canadian farmers who have crossed the border into the northern counties are the largest foreign element.

Only three of the cities have more than 10,000 inhabitants, and about two-thirds of the people live in rural communities. Nearly 90 per cent of the

THESE BRING FAME AND FORTUNE TO VERMONT



Butter and Cheese



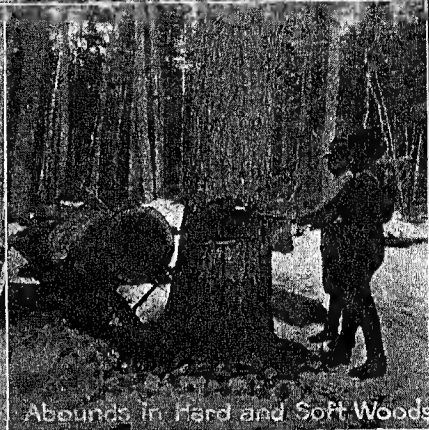
Apples and Pears



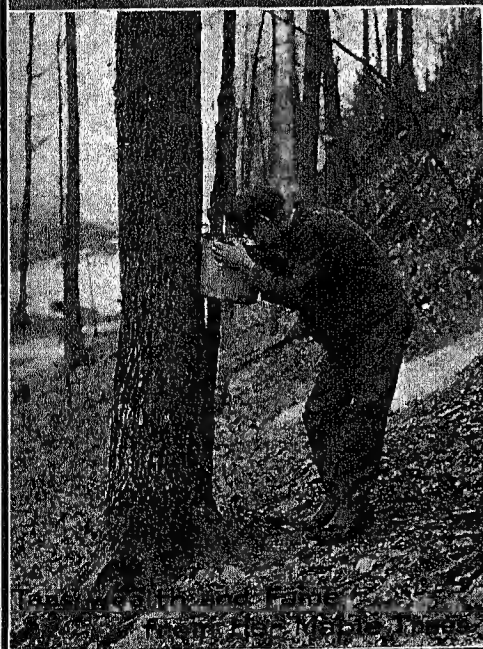
Great Harvests of Hay, the Leading Crop



Organ Manufacture —
One of Vermont's Better Known Industries



Abounds In Hard and Soft Woods



Maple Syrup —
Vermont's Maple Sugar



College of Medicine,
University of Vermont, Burlington



The Capitol, Montpelier

Hay, potatoes, and dairy products are the principal output of Vermont's farms. Fruits are also important, especially apples and pears, in the Lake Champlain region. The forests provide timber of many species, of which the syrup-yielding maple is probably the most highly valued. Genuine Vermont maple syrup and maple sugar are as popular today as they were a century ago.

But not only the farms and forests keep Vermont busy; for the rocks of the state include two of the most valuable for building purposes—granite and marble. This native stone is used with excellent architectural effect in the dignified Capitol at Montpelier and in some of the buildings of the University of Vermont, which was chartered in 1791 and opened in 1800.

THE LARGEST BLOCK OF GRANITE EVER QUARRIED



More than 300 men are sitting or standing on this huge block of stone, the largest single block of granite ever quarried. When it was broken up, 1,700 flat cars were required to distribute the pieces to various manufacturing plants. The granite quarries are widely scattered in the eastern part of Vermont, all of the granite being obtained east of the Green Mountains. Barre is considered the greatest granite center in the world.

farmers own the sloping acres they till to make a livelihood that satisfies simple tastes. This gives them a self-reliance rare in the modern world.

Mountains Split State in Two

Long and narrow, crumpled and deeply seamed, Vermont lies wedged between the Connecticut River, which separates it from New Hampshire on the east, and Lake Champlain, which forms more than half its western border. (For map see New Hampshire.) Down from the north come the forest-robed Green Mountains in double file, to unite near the middle of the state and continue their march into Massachusetts as a single range. They split Vermont into eastern and western halves so effectively that passable east-to-west roads were few until the coming of the automobile and the tourist stimulated extensive highway building. They so dominate the landscape that there are few places in the state where they cannot be seen. To the west, the Red Sandrock Hills and the Taconics, and to the east the Granite Hills, all rounded by glacial action, add to the scenic beauty that charms admiring visitors. Over "The Long Trail" hikers follow the Green Mountains' crest.

The myriad lakes that spangle hill and dale, and the small swift rivers whose waters leap in sparkling waterfalls or boil through canyons in the rock, yet sometimes linger in quiet pools flashing with speckled trout, bring silver beauty to this vacation land. Lake Champlain, which Vermont shares with New York,

lures thousands for boating and other water sports, and hill-girt Lake Memphremagog, shared with Canada, reflects summer homes that find ideal settings on its islands, points, and headlands. Vermont's large rivers—Indian and pioneer highways through the wilderness of long ago—bear today's steamer traffic or turn giant turbines for industrial power. The White, the Passumpsic, and the West drain into the Connecticut River; the Missisquoi, Lamoille, Winooski, and Otter rivers flow into Lake Champlain. In 1927 the Winooski and its tributaries broke their bounds, tearing out bridges, highways, and railway tracks, sweeping aside houses and factories, and washing away fertile farm land. More than 80 persons perished, and the property damage reached \$32,000,000.

In winter this rugged land is softened by a robe of deep snow, and its hundreds of lakes bear a heavy armor of ice that brings a new army of visitors for winter sports. Good sleighing sometimes lasts three months. Summers are warm, but seldom hot.

Home of Famous Horses and Sheep

Agricultural soils are as varied as the landscape. Though much land is rocky and unproductive, many excellent farms raise rich crops. The best farming country is the Lake Champlain basin, part of the Great Valley of the Appalachians. Hay, the most valuable single crop, is fed during the long winter to hundreds of dairy herds whose products find a ready market in Boston and New York. The state originated

the famous Morgan horse, and its type of Merino sheep has gone out to enrich the pastoral lands of the world. Potatoes and other vegetables go to city markets near by. Large crops of such hardy fruits as apples and pears are raised, chiefly near Lake Champlain. The state is famous for its maple syrup and sugar, and leads the states of the country in output of these products (see Maple).

The forested mountain slopes have furnished great stores of lumber. Though they have been greatly depleted, the state is active in reforestation. It owns many small forests, as do some of the towns. The woods include spruce and other conifers growing near the mountain tops, and birch, beech, maple, and other trees on the lower slopes.

Marble and Granite

From the rock-ribbed mountains come the state's most distinctive products, its marble and granite. All the marble is quarried west of the Green Mountains—chiefly in the vicin-

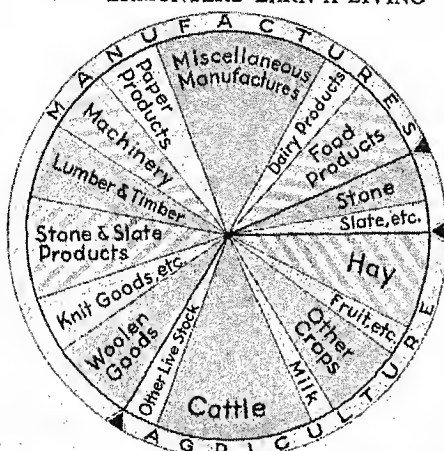
Burlington, on a rolling slope looking across Lake Champlain to the ramparts of the Adirondacks, manufactures a variety of wood products, from refrigerators and doors to spools and bobbins. Textiles, maple sugar, and sugar-making apparatus also are manufactured. Rutland, the marble-working center, also turns out clay, gypsum, and asbestos products, and in addition has a great scale factory.

St. Johnsbury has made scales for over a century. Montpelier, the capital, ships and works in granite and wood. Bennington is noted for its knit goods and paper products. Brattleboro boasts one of the world's largest organ factories; and Orleans for many years has been turning the native woods into sounding boards for pianos. Winooski specializes in textiles, furniture, and wire screening.

A Battleground in Early Days

The white man first saw the Green Mountains when Champlain and a company paddled up the lake now named for him

HOW VERMONTERS EARN A LIVING



AGRICULTURE

MANUFACTURING

TRADE & TRANSPORTATION

OTHER OCCUPATIONS

In the Vermont products chart above, notice how large a proportion consists of manufactured products—textiles, foods, lumber and timber, stone and slate. The chief occupations of the people are compared below.

ity of Rutland—and all the granite is found in the east. The famous Rutland marble is a very pure lime carbonate of almost endless variety, ranging from fine white to almost black. A single quarry may furnish more than 20 varieties, all fine, with veins, clouds, and blotches of blue, pink, yellow, gray, and black; more than 100 shades are obtainable. For many years Vermont supplied at least four-fifths of the marble used in the world, and the Vermont quarries are still among the world's leading producers.

The granite quarries are more numerous and scattered than the marble quarries. Besides Barre, which is one of the greatest granite centers in the United States, Hardwick, Woodbury, Bethel, and many smaller places produce important amounts of granite. Most Vermont granite is gray; the famous "Windsor green granite" comes from Mount Ascutney in Windsor County. Vermont is a leading state also in the production of slate, asbestos, and talc. Other mineral products are kaolin and fire clay.

Vermont's industries date back to the grist and saw-mills the pioneers raised beside the hurrying streams; the homespun cloth which the early housewives wove on crude looms from the wool of their sharp-nosed sheep; the tall masts which the colonists hewed out for the ships of the king's navy; and the marble quarried on Isle La Motte before the Revolution.

in 1609 (see Champlain, Samuel de). The territory was then a battleground for the Algonquins and the Iroquois. For almost a century and a half it remained unsettled, and was known as "The Wilderness." The French built Fort St. Anne on Isle La Motte in 1666, and later strung their fortifications down Lake Champlain, and the English made their first permanent settlement at Fort Dummer, around which the town of Brattleboro was established by Massachusetts in 1724 to protect the settlements at Northfield and in the Connecticut valley. English and French and their Indian allies battled for power here until the French and Indian War (1754-63) ended with the English in control of the Lake Champlain forts. Lord Amherst built a strong fortress at Crown Point, and thrust a military road across the wilderness to the Connecticut River. Settlers came quickly into the now peaceful country.

Boundary lines were uncertain in the colonies. New Hampshire claimed all territory to a line 20 miles east of the Hudson River, an extension of the boundary between Massachusetts and New York, and its governor began issuing grants of land for new towns or townships in this area in 1749. Early settlers came trudging across the mountains to "New Hampshire Grants" to clear the forest and plant crops around new cabins which were perched on the hillsides,

for the comfort of seeing the curl of smoke rising from a distant neighbor's chimney.

Then the governor of New York laid claim to the whole area west of the Connecticut River, because of the grant of Charles II to the Duke of York. The king in council in 1764 decided in favor of New York, and its governor demanded that the settlers pay again for their hard-won acres. He granted their land to New Yorkers in 1765, and five years later sent his officers to dispossess the first settlers. But the intrepid mountaineers, most of them Connecticut Yankees, sent the sheriffs back to New York smarting from a thorough application of the "beech seal" on their bared backs. In 1771 Ethan and Ira Allen, Seth Warner, Remember Baker, Robert Cochran, Peleg Sunderland, and a host of others recruited the daring "Green Mountain Boys," to protect their firesides.

Vermont in the Revolution

When the storm of the American Revolution was gathering, and the Continental Congress met to protest against English taxation and boycott English trade, courts of law were closed in many colonies. A Tory judge was sent from New York to Westminster to open court in March 1775, but citizens took possession of the court-house. The sheriff came to dislodge them, and members of his posse fired on the patriots, mortally wounding William French and Daniel Houghton. This "Westminster Massacre" fired the blood of the settlers, and the Green Mountain Boys joined with vigor in the Revolutionary cause. On May 10, Ethan Allen led them in the surprise and capture of Fort Ticonderoga (*see* Allen, Ethan). Seth Warner and a small force took Crown Point the next day. Other Champlain forts quickly fell. Then, under the leadership of Benedict Arnold, the troops turned seamen and captured British ships and gained full control of the lake. After guarding Ticonderoga for a time, many Green Mountain Boys joined Allen in the futile attack on Montreal in which he was captured and sent to England. Others followed Arnold in his unsuccessful attempt against Quebec.

Meanwhile, the citizens had sent Heman Allen to petition Congress to free them from New York. Congress failed to act, so Vermont conventions took matters in their own hands. At Westminster in January 1777, Vermonters declared that "New Hampshire Grants" should be a free and independent state, named "New Connecticut." Later they changed the name to "Vermont" (from the French words for Green Mountain), at the suggestion of Dr. Thomas Young of Philadelphia. In Windsor on July 8, the constitutional convention adopted a constitution just as news came that General Burgoyne had captured Ticonderoga. Patterned after the Pennsylvania constitution, Vermont's was the first to offer suffrage to all men and to forbid slavery. It provided for a legislature in which representation in the lower house should be by towns rather than by population. Some towns with only a few inhabitants have one representative, just as have cities of several thousand people.

After Burgoyne's victory at Ticonderoga in 1777, he sent 2,000 men to pursue the retreating Americans under General St. Clair. At Hubbardton the patriot army, greatly outnumbered, suffered another defeat. Then Burgoyne, planning an attack on Albany, decided to send a force to Bennington for supplies held by the Vermont troops there under Gen. John Stark. Among this force were bespurred Hessian cavalymen, who hoped to capture mounts from the Americans. General Stark advanced to meet these troops at Hoosick Falls, N. Y., about six miles from Bennington. He vowed to his men: "They are ours tonight, boys, or Molly Stark's a widow." In two battles Stark, reinforced by Seth Warner's troops, routed the British. His victory started the series of defeats that led to Burgoyne's surrender at Saratoga.

Difficulties in Becoming a State

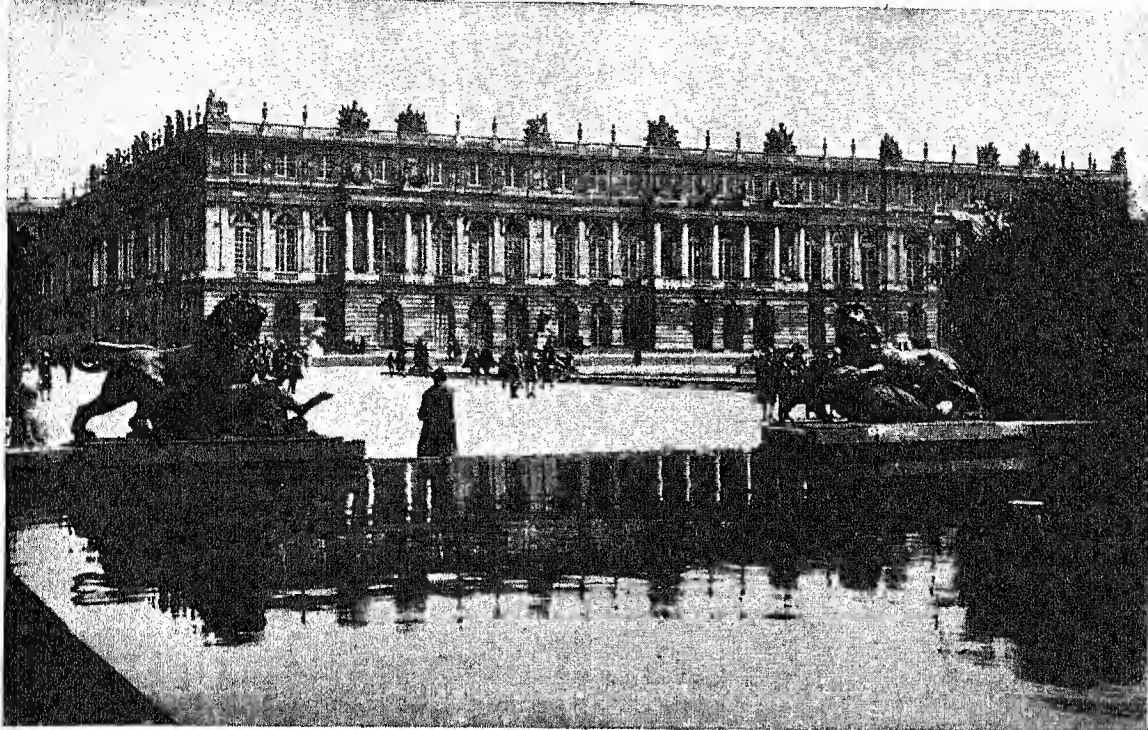
A council of safety conducted Vermont's affairs until the constitutional government was set up in 1778, with Thomas Chittenden as first governor. Again and again the solitary state—now left alone outside the Union of the 13 colonies—petitioned Congress for recognition and protection. In 1780 resourceful Ethan Allen, returned from English captivity, carried on a correspondence with the British in Canada, which led them to hope they might annex Vermont; and thus he kept the British army from invading the state. Some towns in eastern New York and western New Hampshire petitioned to unite with Vermont, and were annexed. George Washington wrote to Governor Chittenden in 1782 that Vermont would be admitted if this territory were returned to the neighboring states, but Congress still failed to act when this was done. Finally, on March 4, 1791, Vermont, with a population of 85,000, was admitted—the first state added to the 13 original colonies.

The War of 1812 again menaced Vermont's borders, and Vermont troops took part in the action about Lake Champlain. During the Civil War, Confederates who had slipped across the border into Canada occupied St. Albans and carried away over \$200,000 from raided banks. Vermont sent more than her quota to the Union army; and the legislature voted \$7 per month extra pay for state troops. In 1866, St. Albans was the headquarters of a band of Fenian partisans who plotted to invade Canada.

Vermont's original constitution provided that it might be amended every ten years, and several amendments have met the needs of the state. Its legislature has a senate of 30 and an assembly of 246 members, one for each town. A distinctive feature of Vermont's government is the town meeting, which is still the most important unit of local government.

In education the state stands high. The pioneers put up log schoolhouses almost as soon as they had finished their cabins. The University of Vermont at Burlington was chartered in 1791 and Middlebury College in 1800. Norwich University is at Northfield, and St. Michael's College near Winooski. Bennington College, at Bennington, was chartered in 1925.

THE FAMOUS PALACE OF VERSAILLES, SCENE OF HISTORIC TREATIES



The central structure and one wing of the Grand Palace are viewed above as seen from the park. The enormous palace, which can house 6,000 persons, and its magnificent grounds, adorned with ponds, statues, and broad walks, were the scene of Louis XIV's greatest triumphs. The Grand Palace served as a model for princely residences all over Europe.

VERSAILLES (*vēr-sā'yē*), FRANCE. On Jan. 18, 1871, the Hall of Mirrors of the Grand Palace at Versailles—the palace built by the magnificent Louis XIV near Paris—was aglow with pomp and ceremony. But it was not French pomp, and if the old walls could, they would have cried out against the spectacle. For the Prussian conquerors of France were there proclaiming in the heart of the vanquished land that King William of Prussia was henceforth to be emperor of a new-founded German Empire.

Forty-eight years later, the statesmen of 27 allied countries sat in this same palace. The German Empire, with its military power and its wealth, had been crushed, and the allied representatives were discussing what terms of peace and reparation should be imposed upon it. It was no mere coincidence that this palace should have been chosen for the drawing up and signing of the Treaty of Versailles, which ended the World War of 1914–1918 and gave birth to the League of Nations. The palace has additional interest for Americans because here on Nov. 30, 1782, was signed the preliminary treaty of peace by which Great Britain recognized the independence of the United States.

The palace is one of the most magnificent in the world. In building it, Louis XIV spent so much money that he destroyed all the accounts, so his people should never know the full extent of his extravagance. It has so many rooms that it takes several hours just

to walk through them all, and they are filled with works of art that alone cost millions of dollars. The palace is more than a third of a mile long. The Battle Gallery, an immense room 400 feet long, is lined with paintings representing famous French victories and busts of patriot heroes. Near by Louis XIV built a smaller palace called the Grand Trianon; and later his great-grandson, Louis XV, had a still smaller one built, called the Petit Trianon, for Madame Du Barry. Here Marie Antoinette later built her theater, and around it a country village of half a dozen thatched cottages and a marble dairy in which she played at being milkmaid.

The great palace is surrounded by wonderful gardens with terraces, a big lagoon, beautiful woods, and many fountains. In the glassed-in orangery are 1,200 orange trees, some of them said to be 500 years old.

The grandeur of Versailles was falling into decay when restoration was started in 1924, largely through financial aid from John D. Rockefeller, Jr. Falling roofs were rebuilt in modern water-tight construction; statues and fountains black with age and dirt were cleaned and restored to their natural tints; the marble pillars and surfacings of the Trianons were cleaned; transplanted trees replaced hundreds that had rotted; a modern double roof over the chapel was installed to protect the famous paintings on the ceiling; and even Marie Antoinette's village and dairy were restored to their old appearance.

The town of Versailles is 11 miles west of Paris and has normally about 75,000 inhabitants. But many of these had fled by June 15, 1940, when an invading German army raised its flag over the Palace of Versailles.

VERTEBRATES. Animals with backbones, including the most highly developed creatures—fishes, reptiles, birds, and mammals—are called vertebrates. They differ from the invertebrates or “backbone-less” animals in many other ways. The jointed hollow backbone and its upper extension, the bony brain-box or cranium, together form a protecting case for the central nervous system. Typical vertebrates have a head, four limbs, a trunk, and a tail—though snakes have lost all their limbs, whales have lost two, and the higher apes and human beings have lost their tails. Almost all young vertebrates have “gill-slits,” showing racial development from a water-inhabiting ancestry. Fishes and some amphibians breathe through these gill-slits throughout life; but in most amphibians (frogs, for instance) the gill-slits close and disappear during the tadpole stage. In the higher vertebrates the slits disappear before the animals are hatched or born.

Most important of all is the supporting rod in the back. When the animal starts life, this rod is just gristle, and is called the notochord. In some primitive forms, such as the amphioxus (lancelet), it never develops further. Sharks and rays may have it sheathed in a cylinder of gristle. In the true vertebrates, the notochord develops into a backbone. Recent schemes of classification group primitive animals having only notochords together with the true vertebrates in the phylum *Chordata*. (See *Animal Kingdom; Zoölogy Reference-Outline*.)

VESPUCCIUS (*vēs-pū'shūs*), **AMERICUS** (1451–1512). In a geography printed in the year 1507, a German professor named Waldseemüller said: “Another fourth

part of the globe has been discovered by Americus Vesputius. So I do not see why anyone should rightly object to calling it ‘America’, after its discoverer Americus.”

Waldseemüller had probably never heard of Columbus. His suggestion, taken up by the early map makers, resulted in one of the greatest injustices in history—the naming of the New World after an unimportant Florentine merchant who accompanied Spanish or Portuguese expeditions to South America and wrote about them, instead of after its real discoverer, Christopher Columbus.

Americus Vesputius (or Amerigo Vespucci, as the name is in Italian) was in Spain at the time of Columbus’ first and second voyages. In a Latin letter, printed about 1504, he claimed to have made four voyages, on the first of which (1497) he explored the South American coast. This would make him the discoverer of the American continent, for at that time Columbus had only reached the outlying islands.

But we have only Vesputius’ word for this voyage, and scholars generally reject it. Vesputius perhaps did accompany a Spanish expedition—that of Ojeda—to South America in 1499; and in 1501 and 1503 he probably went with Portuguese expeditions. But he seems never to have commanded an expedition himself, and was in no sense the “discoverer” of the continents to which his name is given.

VESTA. The hearth, in ancient times, was the center of family life. It was the place where the meals were prepared, the family gathered; above all, it was the place where sacrifices were offered to the gods, so that it came to be regarded as a sacred altar.

VESTAL VIRGINS LEARNING THEIR SACRED DUTIES



The chief duty of the Vestal Virgins of ancient Rome was to keep the sacred fire burning in the Temple of Vesta. They also brought water from a sacred spring for the ceremonial sweeping and sprinkling of the shrine; they offered sacrifices and libations, guarded the sacred objects, and offered daily prayers for the state. They lived in great splendor in a magnificent mansion, with public slaves to wait on them, and occupied the best seats at theaters and other places of amusement.

The Romans worshipped Vesta as the goddess of the hearth and the guardian of family life, and a beautiful temple in the Forum was dedicated to her service. Here the ever-burning sacred fire was guarded by priestesses called "vestal virgins," at first four but afterward six in number. They were from six to ten years old when chosen, and spent 30 years in the service—the first ten in learning their duties, the second ten in performing their services as priestesses, and the last ten in teaching the new virgins. Thus there was a total of 18 maidens, of whom only six were actively performing the duties of Vestal Virgins. They were bound by vows to remain chaste and pure, and to protect the sacred fire even in time of danger; for to allow it to be extinguished would, it was believed, bring disaster upon Rome. If a Vestal violated her vow, she was stoned to death or buried alive.

On the first day of March, the Roman New Year's Day, the sacred fire was renewed. The chief festival in honor of Vesta was celebrated in June. In private houses the feast was kept by eating a meal of fish, bread, and herbs before the hearth and the images of the *Lares* and *Penates*, or household gods.

In much the same way the Greeks worshipped the goddess Hestia, and in her honor a sacred fire was kept constantly burning in the *prytaneum* or assembly hall of every state.

VESUVIUS, MOUNT. Across the beautiful Bay of Naples, less than ten miles from the city of Naples, stands the famous volcano of Vesuvius. A cloud of dust and steam eternally wreathes its summit, for Vesuvius never slumbers; and the dwellers at its foot cast many an anxious glance at its menacing bulk whenever the cloud seems blacker and denser than usual. Vesuvius has taken a heavy toll of life and property through the centuries since daring men first settled in its shadow, and no man knows when other villages will share the fate that overwhelmed the buried cities of Pompeii and Herculaneum over 1,800 years ago.

One of the most destructive of recent eruptions took place in April 1906. For a week Vesuvius had been ominously quiet, sending forth from its crater only a sluggish stream of lava and little puffs of steam. Yet

the instruments in the observatory half-way up its side showed that internal agitations were going on. Presently the steam cloud increased in volume, and masses of red-hot rocks and ashes shot up to the height of a mile or more, mingled with the steam.

The eruption increased spasmodically. Great boulders could be seen rising and falling in the mighty jet of steam and spearlike shafts of fire. Suddenly heavy explosions tore open the whole mountain side and made new vents for the streams of lava which bathed the volcano from base to summit in a bright red glow. The fiery fountain bursting from the crater seemed to lose all trace of steam and to be composed wholly of incandescent light.

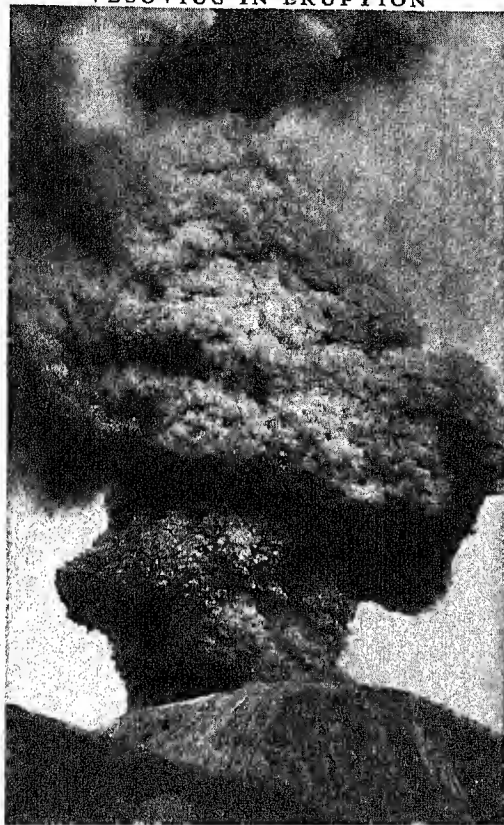
The entire mountain was now a huge boiler, humming and palpitating with internal pressure. From time to time there came staggering shocks of earthquake. At last came the crisis, when portions of the rim were blown away, the center was cored out to a great diameter, and the height reduced 300 yards on the northeast side. Alongside the vertical column of fire, a side jet of thousands of tons of cinders and small stones shot out over the villages below.

For a week the shower of sand was almost constant, and as the black eruption cloud kept rolling down on the valley, the darkness was unbroken. When the cloud at last cleared, there was devastation everywhere. Once more Vesuvius had reaped its harvest of lives.

Mount Vesuvius is about 30 miles in circumference at the base. The height varies several hundred feet from time to time, according to the effects of successive eruptions, but it averages 4,000 feet above sea level. The mountain has two summits. The lower, called Somma, half encircles Vesuvius proper, the present active cone. The top of Vesuvius is cut off or truncated and is about 2,000 feet across.

The region about the volcano has been densely populated for more than 20 centuries. The great eruption of Aug. 24, 79 A.D., which destroyed Pompeii and Herculaneum, was the first one in historic times (*see* Pompeii). During the next 1,500 years there were occasional eruptions, but none of equal magnitude.

VESUVIUS IN ERUPTION



No, volcanoes do not smoke, as you might suppose. These dark clouds are composed of steam and other gases mingled with dust and ashes thrown out of the volcano's mouth. This black column reached a height of thousands of feet during the eruption of Vesuvius in 1906.

In 1631 another violent eruption destroyed 18,000 lives. Since that time Vesuvius has never been entirely quiet, and in the last century the eruptions have increased in frequency.

An electric railway carries passengers from Naples to the foot of the cone, and a wire rope railway leads from there to within 150 yards of the mouth.

VETO. "I forbid" was the formula used by a Roman tribune when he disapproved decisions of the senate or actions of other officials. We have taken the Latin expression for "I forbid," *veto*, and use it to mean the right of an executive to forbid or withhold assent to acts passed by a law-making body.

In the older nations of Europe the king had the *absolute veto*; that is, by refusing his assent he could prevent acts of the legislature from taking effect. This right of absolute veto still exists in Denmark, Sweden, Rumania, and Yugoslavia; but in most other nations today the veto power of the chief executive has been limited or abolished. In Norway, for example, the sovereign may veto an act twice, but if the legislature passes the act a third time it becomes law. The president of France has no true veto power, but he may refer a bill back to the legislature for further consideration.

The Royal Veto in Great Britain

The king of Great Britain still has nominally the right of absolute veto, but no British sovereign has vetoed an act of Parliament since 1707. Long after the veto had fallen into disuse in England, however, the king still exercised it freely to nullify legislation passed in the American Colonies.

The colonial leaders so deeply resented this use of the veto that they listed it as the first of their protests in the Declaration of Independence, saying of the king: "He has refused his Assent to Laws, the most wholesome and necessary for the public good."

Yet when these same leaders drafted the Constitution of the United States, they gave the president the power of veto, because they feared Congress might sometimes be misled by "democratic haste and instability" and might encroach on the executive.

This was not, however, the absolute veto which had been so repugnant to the colonies. The president exercises only a *limited veto*. The word "veto" is not mentioned in the Constitution, but section 7 of article I clearly defines the president's right. All bills passed by Congress must be sent to the president. If he approves a bill, he signs it. If he disapproves, he withholds his signature and, within 10 days, returns the bill—with his objections—to the house in which it originated. If, after reconsideration, the bill is then passed by a two-thirds majority of each house of Congress, it becomes a law over the president's veto. (See United States Constitution.)

Since the president is allowed by the Constitution to veto only an entire bill, and not part of a bill, Congress sometimes makes it difficult for him to veto an unwelcome measure, by passing the disputed legislation as a "rider" or supplementary clause in a

bill for appropriations. Since appropriation bills are necessary to carry on the work of government, the president thus is almost forced to assent to a measure which he would otherwise veto.

The importance of the president's veto is that it checks hasty and ill considered legislation. Congress seldom, in proportion to the number of bills vetoed, overrides a veto.

Early presidents seemed to consider the veto an extreme measure. Washington, in the eight years of his presidency, vetoed only two bills. Neither John Adams nor Jefferson used the veto at all.

Jackson gave a new and aggressive interpretation of the right of veto. Until his time, presidents had used it almost solely to prevent unconstitutional legislation. Jackson, however, used it to nullify acts which, though constitutional, were not in accord with his own policy (see Jackson, Andrew).

Not until Tyler's term was a veto overridden. Johnson was the most frequently thwarted president, as a hostile Congress repassed 15 of the 21 bills he had vetoed. The greatest use of the veto power was made by Franklin D. Roosevelt, who, by the middle of his third term, had rejected almost 600 bills.

How the "Pocket Veto" Works

Yet another restrictive power exercised by the president is his use of the *pocket veto*. The Constitution says: "If any bill shall not be returned by the president within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law . . . unless the Congress by their adjournment prevent its return, in which case it shall not be a law." Thus, when a bill to which the president objects is sent to him within ten days of an adjournment of Congress, he may nullify the bill by "pocketing" it—that is, by merely neglecting to return it to Congress. In effect, then, the president has an absolute veto over legislation passed in the last ten days of a session of Congress.

The states were slow to grant the veto to their governors, but one after another wrote restricted vetoes into their constitutions until North Carolina stood alone in its refusal. The new North Carolina constitution, however, drafted for submittal in 1934, provided for a limited veto. In most states a proportional majority, such as two-thirds or three-fifths of each house, is needed to override the veto; others require only a bare majority.

VICE-PRESIDENT OF THE UNITED STATES. The Constitution of the United States provides that in case the president dies or becomes disqualified for holding office, he shall be succeeded by the vice-president. This has occurred six times in the history of the country, each time through death of the president. Should the president-elect die, the 20th amendment provides that the vice-president elect shall become president (see United States Constitution). Since he may have to act as chief executive of the nation, the qualifications for vice-president are the same as those for president (see President of

the United States). He is elected at the same time and in the same manner as the president. His term is for four years.

Originally, there were no candidates for this office as there are now, but the man receiving the second largest number of votes for president became vice-president. In 1801 Jefferson and Burr each received 73 electoral votes and the House of Representatives had to decide between the two candidates. After 36 ballots, Jefferson obtained a majority, and Burr became vice-president. This contest aroused intense excitement all over the country, and the earnest opposition of Alexander Hamilton to Burr was one of the chief causes of the famous quarrel between the two men, terminating in a duel in which Hamilton was killed. To prevent another such bitter contest, the 12th amendment was adopted, providing for separate ballots for the two offices in the electoral college.

The vice-president's sole duty is to preside over the Senate. Even in that position he has little influence. He casts the deciding vote in case of a tie, but as presiding officer he is hedged in with rules to prevent him from influencing the deliberations. In case the vice-president dies or becomes president, the Senate selects one of its own members to preside.

This unimportance of the vice-presidency is a serious weakness in the governmental machinery. Since any congressman or senator can be far more influential than the vice-president, there is little in the office to attract men of outstanding ability, and the nomination usually goes to the "favorite son" of some doubtful section to secure its political support for the ticket. The result is that the vice-president is often poorly qualified to become chief executive.

VICKSBURG, BATTLE OF. On Jan. 29, 1863, General Grant was put in command of the Army of the West with the orders to capture Vicksburg, the last important place held by the Confederates on the Mississippi, and the only point at which they could keep up communication with the states to the southwest. To sever this connection it was necessary to capture the city. Lincoln was eager for a victory for another reason also. There was great discouragement at the North; a draft had been necessary to raise men for the army; the party demanding peace at any price was increasing, and the elections of 1862 had gone against the party which favored continuing the war.

Under these circumstances a victory for the Union forces was necessary; but it was a hard task that was allotted to General Grant. Vicksburg is located on a high bluff on the east bank of the Mississippi, but the land approaching it is marshy and difficult to cross. In spite of the almost insurmountable obstacles Grant set determinedly to work. For weeks his men fought desperately, with pick and shovel rather than with guns, digging a canal across the neck of land opposite to Vicksburg. They hoped by this means to turn the Mississippi from its old bed and so gain access to the city. In this conflict with the "Father of Waters" they were defeated. Another way had therefore to be

sought to reach the city. There was only one place where this could be found, and that was to the south.

The west bank of the Mississippi was now dry enough for the men to traverse, but how were they to recross to the east bank after getting below the city? This could be done in only one way: The fleet must brave the Confederate batteries and go down the stream as the men marched along the west shore. One dark night the attempt was made. The Confederates learned of the plan, and sent some of their men across the river in skiffs to set fire to houses on the opposite shore, in order that Confederate gunners might have light to see the Union ships. Nevertheless all but one of the Union's vessels ran by the batteries in safety, and, once below, they quickly carried Grant's men across to the eastern bank.

Seven Battles and Seven Weeks of Siege

This was all accomplished by the last of April 1863. Now began the task of pushing the Confederate troops back into the city. Seven times Grant met and defeated them before he reached Vicksburg. Failing to take the town by storm, he settled down to starve it into surrender. For seven weeks the enemy held out.

A Confederate lady who was shut up in the city gives this description of life during that trying time: "So constantly dropped the shells around the city that the inhabitants made preparations to live under the ground during the siege. We seized the opportunity one evening, when the gunners were probably at their supper, for we had a few moments of quiet, to take possession of our cave. Our dining, breakfasting, and supper hours were quite irregular. When the shells were falling fast, the servants came in for safety, and our meals waited; again they would fall slowly, with the lapse of many minutes between, and out would start the cooks to do their work."

Finally there was no work for the cooks to do. Supplies ran low, and people were put on half-rations. The horses and mules in the city were killed to supply meat, and men were dying of disease and starvation. When General Pemberton finally asked what terms would be given them, Grant replied with the same phrase which he had made famous the year before at the surrender of Fort Donelson: "Unconditional surrender." These hard terms Pemberton was forced to accept on July 4, 1863. Vicksburg had fallen; the Confederacy was divided; and the Father of Waters thenceforth "flowed unvexed to the sea."

The City of Vicksburg

Vicksburg is the third city of Mississippi and its major river port. To the north is the fertile Yazoo basin, noted for its cotton and cattle. These products and hardwood lumber come to the port for shipment. Manufactures include machine-shop products, cottonseed oil, and wood products. The Mississippi River flood control headquarters are here. Thousands of Union soldiers are buried in the Vicksburg National Cemetery. The Vicksburg National Military Park, covering the battle area, has a historical reference library and museum. Population (1940 census), 24,460.

VICTOR EMMANUEL II, KING OF ITALY (1820-1878). "What my father has sworn I will maintain," declared the young king of Sardinia-Piedmont, Victor Emmanuel II, when he ascended the throne after the disastrous defeat of Novara in 1848. This meant that he refused the inducements which victorious Austria offered him, and that he would continue the newly adopted constitution of his kingdom and the tricolored flag, emblem of the hoped-for Italian unity. This attitude won for Victor Emmanuel the title *Re Galantuomo*—the "Honest King"—and it rallied to his support all Italian patriots who longed to free their land from Austrian control and unite its numerous states into one.

It was a difficult task which Victor Emmanuel took up when his father Charles Albert abdicated, hoping that his son could secure better terms from the victorious Austrians following the unsuccessful revolution of 1848. The army was disorganized, the treasury empty, the people despondent. But the king was fortunate in securing the services of the statesman Cavour, and Cavour was fortunate in having as his king Victor Emmanuel.

Regardless of his personal inclinations, the king consistently supported his minister. Though a devout Catholic, he consented to the abolition of a large number of the monastic houses because he felt that it was for the good of the kingdom. He gave up Savoy, the cradle of his family, and the territory of Nice, to secure the indispensable aid of Napoleon III against Austria. And he sacrificed his own personal feelings to the good of his country when he consented to the marriage of his daughter to the dissolute cousin of Napoleon III as part of the price France demanded.

Only once did Victor Emmanuel fail to support Cavour. In 1859 when Cavour learned that Napoleon was abandoning his ally and withdrawing from the war before Venetia was freed from Austrian rule, he rushed to the king and wildly demanded that Sardinia continue the struggle alone. But Victor Emmanuel saw more clearly than his minister this time, and accepted—though with bitter regret—the peace of Villafranca.

Even so, the kingdom of Sardinia-Piedmont was increased by the conquered province of Lombardy. Then the states of Tuscany, Parma, Modena, and Romagna refused to take back their old autocratic rulers from whom they had revolted, and voted to become parts of the kingdom of Victor Emmanuel. On Oct. 29, 1860, Garibaldi, the knight-errant of Italian unity, handed over to the king Naples and Sicily, won by the valor of his army of "Red Shirts"; and on Feb. 18, 1861, a parliament proclaimed Victor Emmanuel II as "King of Italy."

Venice and Rome were still outside his kingdom. But these too were finally added—the one in 1866 and the other in 1871 (see Italy). Finally on July 2, 1871, Victor Emmanuel made his solemn entry into Rome, the Eternal City, which then became the capital of his kingdom. The union of Italy was complete.

VICTOR EMMANUEL III (born 1869) succeeded his father, King Humbert, who was king from 1878 until his assassination in 1900. A little man (scarcely more than five feet in height), King Victor Emmanuel was a shy, gentle person. He averted a possible civil war in 1922 by calling Mussolini to the head of the government; but the Fascist régime later reduced the throne merely to a figurehead. In 1929 he ratified the Lateran Treaty, which recognized the temporal power of the Vatican. During the second World War Mussolini's conquests gained him for a brief time the titles of king of Albania and emperor of Ethiopia.

VICTORIA, AUSTRALIA. A little triangle tucked in the southeastern corner of Australia, Victoria occupies less than 3 per cent of the total area of this British dominion; yet it has more than 25 per cent of the total population. It is the greatest agricultural state of the commonwealth, having four times as much land under cultivation as Queensland, which is nearly eight times as large.

The widely irrigated farming region yields crops of wheat, oats, barley, potatoes, hay, and grapes. Among the chief products of the great live-stock industry are wool, meat, hides, skin, and cream. Gold mining is still a large source of wealth, but it has declined since the 1850's, when a gold rush brought thousands of settlers to the region. Large deposits of lignite coal are now being worked and supply the energy for the state's electric power. Millions of acres are so covered with forest-clad mountains as to be too wild for settlement but furnish an almost inexhaustible supply of the finest timber. The climate is excellent, with a bracing, dry, and pleasantly warm atmosphere. Snow falls rarely except on the higher plains and mountains. Melbourne is the capital of the state. Area, 87,884 square miles; population, about 1,820,000. (See Australia; Melbourne.)

VICTORIA, BRITISH COLUMBIA. The traveler who lands at Victoria, capital of British Columbia, might well believe himself to have been dropped by mistake at a seaport in England. The people are chiefly of British descent, and they have built for themselves a city that recalls the beauties of the motherland, with neat homes and gardens bordered by precisely clipped hedges, with substantially built shops and offices, flowers blooming everywhere, and even the massive sea-walls overgrown with ivy. The climate, too, is like that of southern England, cooled in summer and warmed in winter by the ocean breezes, with a plentiful rainfall that keeps the abundant vegetation green all year long.

The famous Butchart sunken gardens, covering 16 acres, include a lake and several waterfalls, many rose gardens, Japanese and Italian gardens, fine lawns and flowers. The gardens occupy former cement factory excavations, and, though the property of the Butchart family, are open to the public.

The quiet conservative tone of life in Victoria contrasts strongly with the busy scenes in the broad harbor. For lying at the southeast end of Vancouver Island (see Vancouver) it is the Pacific gateway to Canada. There is scarcely an hour of the day or night that some ocean liner from a distant port or some

coastwise steamer does not come to port. East meets West in its streets, especially in the district known as "Chinatown," and thousands of Orientals—Chinese, Japanese, and Hindus—have become part of its population. Many Chinese are employed as house servants. The Asiatic influx was so great that such immigration is now severely restricted.

Victoria's prosperity is the result chiefly of its being the capital of the province and a desirable residential city, although it also ranks as one of Canada's great commercial centers by reason of its shipping and the lumber, mining, salmon-canning, and fishing industries which focus here. Its chief manufactures are ships, hardware, furniture, machinery, and cement. The splendid graystone Parliament buildings are the city's most notable architectural feature.

The nucleus of the present city was Fort Victoria, established in 1843 by the Hudson's Bay Company as a trading post. It leaped into prominence with the gold rush of 1858, when thousands of fortune hunters poured in; it was incorporated in 1862 and became the capital of British Columbia in 1868. Population, 39,082.

VICTORIA, QUEEN OF GREAT BRITAIN AND IRELAND (1819-1901). The late Queen Victoria was the daughter of the Dowager Princess of Leiningen and the Duke of Kent, brother of William IV. At her birth there were five persons between her and the throne, but they all died before she came of age. She was brought up quietly by her German mother, but was carefully instructed in the languages, in history, and in government. Sir Walter Scott saw her when she was nine years old and remarked, "This little lady is educated with much care and watched so closely that no busy maid has a moment to whisper, 'You are the heir of England'." From the time she was 14 she was taken around to the country houses of the nobility. She proved a very charming young woman, simple-hearted, lively, self-possessed, fond of music and dancing.

When she was 18 (in 1837), her uncle William IV died. She received the news of her accession with great calmness. Being a woman she could not succeed to the throne of Hanover, which had been under the same sovereign as the British dominions since the accession of George I in 1714, and this passed to the nearest male heir. Of Victoria's first meeting with the Privy Council, the Duke of Wellington said: "She not merely filled her chair, she filled the room." Of her speech opening her first Parliament, Charles Sumner, who was visiting from America, said: "Her voice was sweet and finely modulated. I think I have never heard anything better read in my life."

The young queen had been brought up in a very "low church" or evangelical fashion, and she established at once something new in court life, for a high standard of morals and behavior was expected from everyone connected with the court. She had a great deal to do with fixing upon England that spirit of reticence and sober morality which has come to be known as "mid-Victorian."

It was fortunate for her that her first prime minister was the Whig leader, the Earl of Melbourne, for he took great pains with her political education and played the part of a prime minister, father, and private secretary to the inexperienced young woman. From the first the queen was inclined to emphasize the power of the sovereign, but she was slowly led to see that as a constitutional sovereign her real political influence was very small, and she must follow the advice of her ministers.

Two years after her accession she married her first cousin Prince



QUEEN VICTORIA
On Britain's Throne for 64 Years

Albert of Saxe-Coburg, one of the smaller German principalities. The match had been suggested some years earlier by her German relatives and advisers, but was finally settled at the queen's instance, who asked her cousin to marry her. It proved a marriage of love on both sides. He was a man of the highest character, devoted to art, music, and literature, and his influence on affairs was almost wholly good. The queen was able not without pressure to have her husband made "Prince Consort" and she always insisted upon his having a part in the government, a course which provoked criticism from many of her subjects. She looked up to him, counted him her chief adviser and private secretary, resented criticism of him, and after his lamented death in 1861 spent the remaining 40 years of her life in mourning him. Nine children were born of the union. In the bringing up of those children, in their illnesses, in their marriages and offspring, the queen found the chief interests of her life, together with her interests in her many German connections. But this is not to say that she neglected affairs of state. She gave time every day to them, demanded that all dispatches should be laid before her, read everything, and was eager to do her part. She was much interested in foreign affairs, but her notion of foreign policy was one that would benefit her many German relatives. She had dynastic conceptions of statecraft. Her foreign ministers were inclined as tactfully as possible to neglect and ignore her advice, and Lord Palmerston in particular, when foreign secretary, received several severe rebukes from her because he followed his own policies without heeding her opinions, and when he persisted was finally forced to resign.

Queen Victoria disliked life in London; she took great pleasure in Balmoral, a place she obtained in the Highlands of Scotland, and spent much time there and at Osborne on the Isle of Wight, as well as at the royal palace of Windsor. She was seldom in London more than a day or two at a time. After her husband's death she went into seclusion for years and refused to appear in public.

She made no effort to remain impartial as between the two political parties. In her earlier years as ruler she was a strong Whig, because of her friendship for Lord Melbourne. In her later years she was greatly fascinated by Disraeli, the Tory or Conservative leader, who deferred to her and cultivated the art of pleasing her. In 1876 he obtained the passage of a bill through Parliament conferring on her the title "Empress of India," largely to impress her subjects. His fall from power in 1880 was a hard blow to the Queen; she never concealed her dislike of Gladstone, and kept up a secret correspondence on state affairs with the fallen minister. In her later years too she pressed her foreign policy in support of the Turks against Russia even to the verge of war. She became indeed a thorough-going imperialist and was eager to see England take the aggressive rôle which she had rebuked Palmerston many times for pursuing. She would have stretched her prerogative very far; when she had to choose Liberal (Whig) ministers she went out of her way to snub Gladstone. She insisted too on her personal right of appointments to church

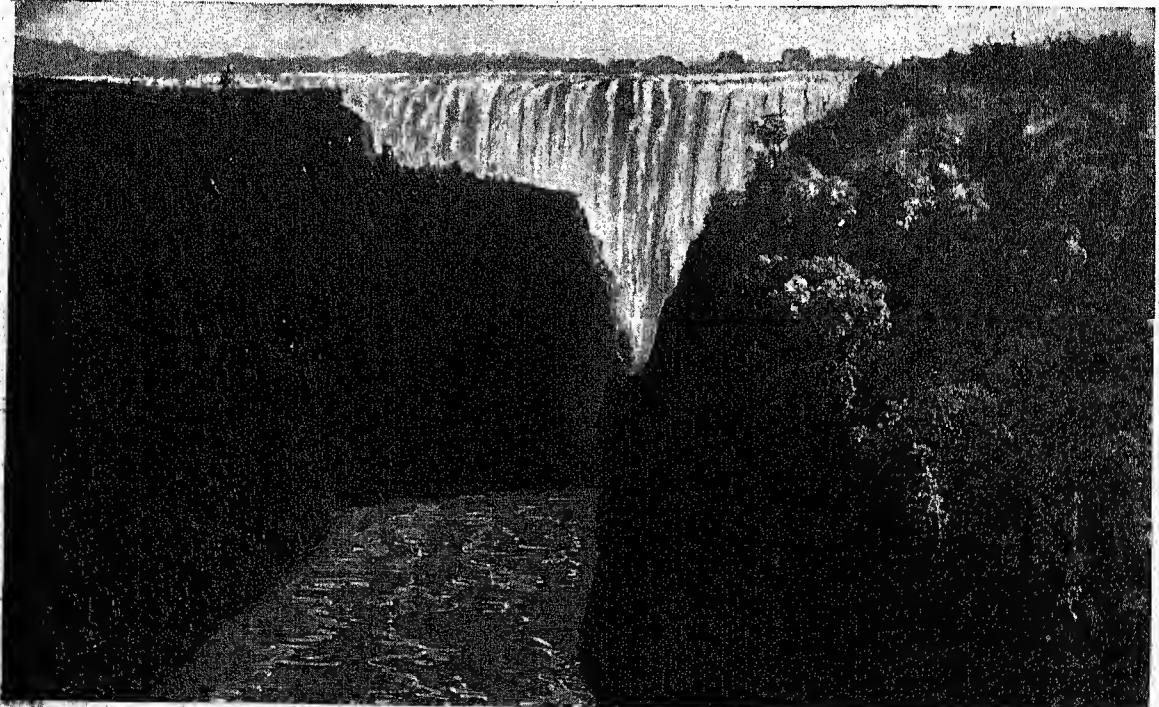
offices, and had her way many times, exercising often great favoritism. After Disraeli's death she looked to Lord Salisbury and to Joseph Chamberlain as her favorite political advisers.

Victoria reigned longer than any other sovereign in English history. She was 82 years old when she died, had ruled 64 years, and retained her powers until nearly the last week of her life. She was quite unwilling to allow her eldest son, the Prince of Wales, to act in any of her capacities, and kept him as far as possible out of public life, even though he was a man nearly 60 when she died.

Victoria was a good woman, conscientious and highminded; but not clever nor even very wise. She was a bundle of prejudices, but she played her part as sovereign fairly well. On the whole her reign points the danger of the system of monarchy in modern politics; dynastic conceptions and relationships should have no part in modern diplomacy or state policy.

VICTORIA FALLS. This mightiest of all waterfalls in the world is situated in Rhodesia, British Africa, at a point where the Zambezi River passes from the central African plateau to lower levels. Its roar is like continuous thunder, and the vapor from the falling waters rises in a column that can be seen for miles. The native African name for the falls is "Thundering Smoke" (*Musi-oo-tunya*). We can imagine the sensations of awe and exultation with which Dr. Livingstone, the first white man to view it, gazed in 1855 upon this mighty spectacle.

VICTORIA FALLS, THE MIGHTIEST CATARACT IN THE WORLD



Nearly twice as high as Niagara Falls, the falls of the Zambezi River are the greatest spectacle of the kind in the world. They were named in honor of Queen Victoria by David Livingstone, who discovered them in 1855.

The height of Victoria Falls is nearly twice that of Niagara. It is divided by islands into four separate cataracts, of which the middle two, Main Fall and Rainbow Fall, are the widest. Their breadth together is slightly greater than that of the Horseshoe Fall and American Fall of Niagara, and the total breadth at the edge is considerably over a mile. The river pours perpendicularly into a deep chasm or crack in the earth, set squarely across the current. From this it issues roaring and boiling in a narrow gorge leading to a Z-shaped canyon. A railway crosses the canyon so close to the falls that passengers are wet with the spray. A hotel has been erected for the accommodation of visitors, and projects are under way for utilizing the enormous water power.

VICTORIA NYANZA, or LAKE VICTORIA. When the English explorer John H. Speke discovered Lake Victoria in 1858, he believed he had come upon the source of the Nile River. He christened the lake Victoria Nyanza (*nyanza* is the native word for lake), in honor of the reigning queen of England. Now, however, the various streams which unite to form the Kagera River, the principal feeder of Lake Victoria, are regarded as the true source of the Nile (*see* Nile River). Speke later explored part of the shores of the lake he had discovered, but Lake Victoria remained largely a mystery until 1874, when Henry M. Stanley sailed around it, braving its unknown waters and its sudden and violently treacherous storms.

Second in size only to Lake Superior among freshwater lakes, this vast body of water in the heart of Africa stretches across 250 miles at its longest point, and it is 200 miles across at its greatest width. Its area is more than 26,000 square miles.

Mountains and plains, swamps and bays mark the shores, and wooded islands rise above the waters of the lake. Steamers cross on a regular schedule, and the Kenya and Uganda Railway links Lake Victoria with the Indian Ocean at Mombasa. The lake lies on the Equator in British territory in eastern Africa, its shores bordering Uganda Protectorate, Tanganyika Territory and Kenya Colony.

VIENNA (*vē-n'ā*), GERMANY. No other modern city has been so humbled as beautiful Vienna, former capital of Austria. Power and prestige fell away after 1919, when the once mighty empire was reduced to a tiny republic. And in 1938, when Austria was annexed by Germany, Vienna was reduced to a mere provincial city (*see* Austria). But this city of the Danube is still important commercially, for she stands at the gate between western and eastern Europe. Favored by this strategic position, for 2,000 years she has taken toll of the caravans of nations.

Vienna (called *Wien* in German) is one of the largest cities of Europe in area. When the last Hapsburg rulers modernized it during the 19th century, this spaciousness permitted palaces and public buildings to rise in the heart of the city—enabling political, social, and business life to go on where it had for centuries. The wall and moat that had protected the

old city against her many foes gave way, in 1858, to the magnificent Ringstrasse. With its two promenade walks, two carriage roads, a bridle path, and a tramway down the center, this marks the boundary of the "inner city." Along this street are the buildings for which Vienna is so justly famous. Nothing better shows her cosmopolitan spirit than her architecture. The stately Grecian houses of Parliament look out upon the lavishly decorated Gothic Rathaus (city hall), while near by is the university, a magnificent specimen of the Renaissance style. Farther around this two-mile circle are the beautiful opera house, luxurious shops, the Academy of Art, which ranks as one of the finest galleries of the world, and the Hofburg. This is the famous Hapsburg palace, a collection of buildings of various epochs built in various styles. In addition to the private and state apartments it contains a large library with many rare books and manuscripts.

Reminders of the Middle Ages

In the narrow, crooked streets of the inner city still lingers something of the spirit of the Middle Ages. The old buildings, many of them dating back to the 13th and 14th centuries, are little touched by modern hands. Chief among them is St. Stephen's Cathedral, from whose tower the despairing Viennese scanned the horizon for the banners of Sobieski's army in 1683. Only a step away is the Graben with its smart modern shops, its banks, its gilded cafés, its crowds of shoppers, and its coffee houses where for decades all Vienna could be seen drinking coffee and chatting at five o'clock in the afternoon. The café was the center of social life. Each had its own group; one was favored by merchants who came to discuss prices and transportation; another was the resort where actors and musicians exchanged the small talk of their craft. Perhaps the part the cafés played was so great because most of the people live in apartment buildings; relatively few live in houses.

A City Famous for Gaiety

Assuredly it was the street life that gave Vienna a distinctive charm in her golden days, when she was a city of gaiety, of life, of music, and of dancing. While the rich aristocracy rode leisurely up and down the Ringstrasse, the rest of Vienna promenaded along the walks. Merchants brought their families for a treat, and vividly uniformed officers strolled about. There were students from the university, music students from the ends of the world, nursemaids with their charges, and everywhere the beautiful Viennese women. In the people's playground, the court garden near the Hofburg, all day long the benches were filled with the good-natured, frank Viennese, always cordial to the stranger, seemingly always happy. On Sundays and holidays crowds of merry-makers flocked to the Prater, a beautiful 2,000-acre park which stretches from the Danube Canal on its western edge, along a tiny section of the Ringstrasse, to the Danube itself, which is a mile away from the city proper. Here were theaters, circuses, menageries, restaurants,

music everywhere, and dancing all day long. The Prater, which was once an imperial deer park, is really a huge island, about four miles long and two miles wide, beautifully laid out and adorned. There are several other spacious parks, and more than 50 per cent of the remaining area of the city is occupied by private gardens, woodland, or cultivated land.

Artistic and Industrial Life

Vienna was the cultural as well as the political capital of Austria. In architecture and art she reached the heights, but true to her cosmopolitan taste she preferred to choose the best from the work of other nations, rather than develop a school of her own. Music has been her special contribution. Haydn, Mozart, Beethoven, Schubert, and the waltz king Johann Strauss were some of her gifts to the world.

In her industries also Vienna displayed her artistic skill. All the world knows the fame of the jewelry and articles of precious metals her artisans have wrought, her leather goods, musical instruments, optical goods, and furniture. Other manufactures are machinery, railway engines and carriages, textiles, and chemicals. For communications the city has, besides the Danube River, railroads that radiate in every direction. These make it an important distributing center for corn, flour, cattle, wine, sugar, and a large variety of manufactured goods.

The story of Vienna goes back to the early years of the Christian era, when Roman legions tramped into the little Celtic village of Vindobona on the Danube River, and there established a garrison to protect the frontier. Here Marcus Aurelius died in A.D. 180. Soon the town was overrun with the barbarian hordes pouring down into the Roman Empire; Attila and his Huns tarried for a time on their way to the West. At the end of the 10th century "East Mark" emerged from the gloom of the Dark Ages and, in 1237, the city of Vienna received a charter

of freedom from Frederick II. During the Crusades she prospered mightily from the traffic that flowed down the Danube, and grew to the size of the present inner city. But it was not until she became the capital of the Hapsburgs in 1276 that her real glory began. From then on the fortunes of the House of Austria were hers. For several centuries Vienna was the bulwark of western Europe against the Turk, and twice, in 1529 and 1683, she withstood severe sieges. It was during the second siege that John Sobieski and the Poles came to the rescue barely in time to save the city.

In 1814, the city was the scene of the Congress of Vienna (*see* Fact-Index), one of the most brilliant assemblages of monarchs and statesmen the world has

ever seen. Metternich, the master spirit of the Restoration period, was the leading figure. Alexander of Russia, Frederick William, Castlereagh, Talleyrand were others of the notable personages who met to discuss and settle the problems arising from the Napoleonic wars. For months the Austrian capital was a whirl of gaiety; and as many of the grave questions of diplomacy were settled over the banquet table and in the intervals of the dance as around the council table.

In grim contrast to this brilliant scene was Vienna at the armistice of 1918—a shivering, hungry city. The treaty of St. Germain left Austria an island amid a patchwork of rival states, deprived of seaports, coal mines, and rich farming land; and the Vienna that had radiated the glory of the Hapsburgs when they were at the

height of their power shared the disaster of their fall.

After Austria was absorbed by Germany, Vienna lost most of her charm and glory. Under the Nazi régime she became a drab workaday city. Little of the gay café life remained to attract tourists. The superb clinics and theaters declined as government restrictions and anti-Jewish laws drove out many leading scientists and artists. Population, about 1,920,000.

TRINITY COLUMN, IN THE GRABEN



This monument, 69 feet high, which stands in the center of Vienna's shopping quarter, was erected in 1693 to commemorate the cessation of the great plague of 1679. From the three-sided base rises a column of clouds, with angels and cherubs leaning down above figures of the Holy Trinity. The street is built over a moat used in the 12th century.

LEONARDO DA VINCI, a Giant among Giants

The Most Versatile Genius of the Renaissance, and His Great Achievements as Painter, Sculptor, Engineer, Scientist, and Inventor

VINCI (*vēn'chē*), LEONARDO DA (1452-1519).

Three great Italians—Michelangelo, the master of power and strength in all the arts, Raphael, master of beauty and harmony in painting, and Leonardo da Vinci, master of thought and feeling—embodied the Renaissance at its height, before it degenerated from creative power to mere imitation of the classic manner.

Of the three, Leonardo da Vinci reached farthest into the future, for he stood for more than a mastery of art. In the realms of mathematics, science, and engineering his mind was one of the keenest the world has ever known. Curiosity and the love of the uncommon were the ruling passions of his life and led him into investigations that touched many lines of learning as well as art.

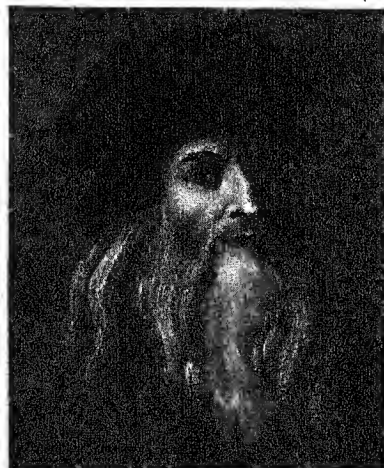
He was a universal genius who made important investigations in the field of geology, geography, and astronomy; he painted pictures which are universally hailed as unsurpassed even in that age of giants; and he planned great engineering works to control the courses of the Arno and the Po rivers, and perfected many practical inventions. He glimpsed secrets of nature that were not revealed till hundreds of years

later. It is said he even designed and made the model of a heavier-than-air flying machine that, judged by the account in his manuscripts, needed only an efficient motor to make it practical.

No single man could have carried out a hundredth part of what Leonardo planned. Realizing the reception given too advanced ideas, he took the precaution to write his manuscripts from right to left, instead of left to right. This makes his many notes and memoranda seem illegible to one who does not possess the key; so they lay almost unheeded until the present day.

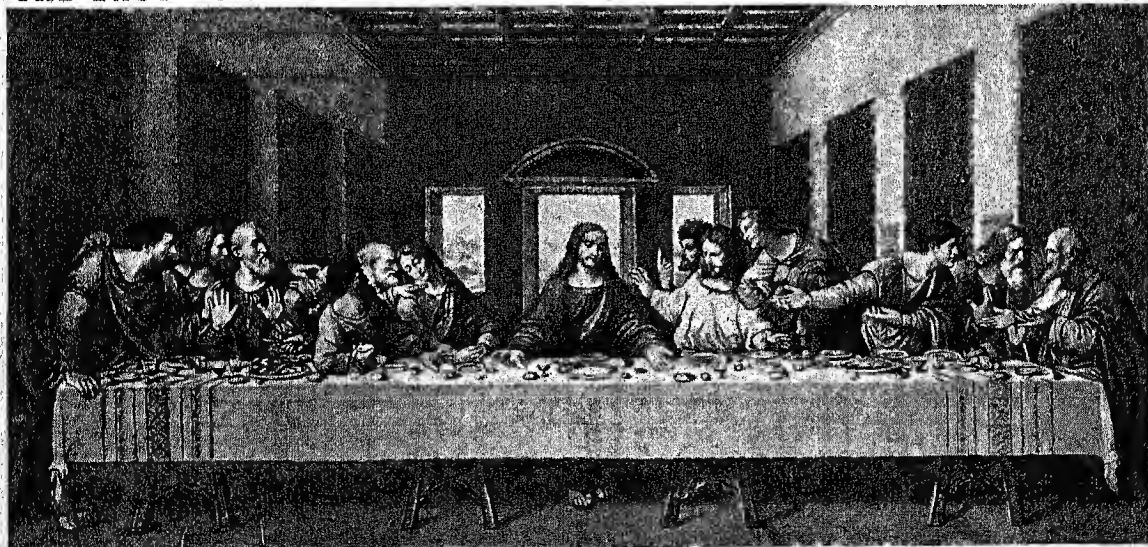
The personal charm of young Leonardo was in keeping with his brilliant mind. As he went about the streets of Florence in his rose-colored cloak, his golden hair falling about his shoulders, his sketch book hanging from his waist, he was a striking contrast to the crowd that followed him. Old and young hung

on his words as he held them with jest, song, or story so that he might study the varying expressions of their faces. In the market place he bought caged birds for the joy of setting them free; or matching his strength with some strolling ragamuffin's, would bend a horseshoe as easily as if it were a strip of lead.



LEONARDO DA VINCI

'THE LAST SUPPER'—ONE OF THE WORLD'S SUPREME MASTERPIECES



Only the age-worn shadow of Leonardo da Vinci's masterpiece, 'The Last Supper', haunts the refectory walls of the old convent of Santa Maria delle Grazie in Milan. When this miracle of murals was painted in 1494, Leonardo apparently experimented with a new paint, which soon began to scale off. Frantic experts repeatedly drenched it with oil, glue, and varnish, until the original all but vanished. Finally a patient expert did restore it, flake by flake, but it glows so dimly no clear photograph of it can be made. The painting shows the consternation of the disciples as Christ said: "One of you shall betray Me."

Leonardo served his artist's apprenticeship as the favorite pupil of Verrocchio, a skilled goldsmith, sculptor, and painter of Florence, who was particularly distinguished as a teacher. When 20 years of age he became a member of the painters' guild, and for the next ten years he practiced his art in Florence, in the golden days of Lorenzo the Magnificent of the house of Medici. Much of his later life was spent in Milan in the service of the usurping duke, Ludovico il Moro, or in that of Caesar Borgia, of unsavory fame, while his last years were passed in France in the employ of King Francis I, where he died in 1519.

A Painter of the Emotions

Unlike most of the great masters, Leonardo da Vinci left few finished works. Yet he is one of the best known among the great men of the world, and it is chiefly as an artist that he is remembered. He made great changes in the technique of painting, for to him light and shade were as important as color to other artists. But the quality that makes Da Vinci's art unique is his ability to put into the faces on his canvas the intangible expression of hidden emotion.

Two paintings by Da Vinci are among the greatest masterpieces of the world—the 'Mona Lisa', a portrait in oils, and 'The Last Supper', a large wall painting on plaster in "distemper" (colors mixed with a water-soluble medium). The 'Mona Lisa' (also called 'La Gioconda') is probably the most celebrated portrait picture in the world. Against a fantastic background of rocks and water, Leonardo painted a face that has been the theme of endless discussions. The picture of this Florentine lady of Neapolitan birth has today lost the wonderful red of the lips and the rose-like quality of the skin, but the shimmer of the eyes, the subtle enigmatic smile playing about the mouth, the wonderful hands, are almost unspoiled by the lapse of years. This picture, the pride of the Louvre museum in Paris, was stolen from its gallery in 1911; but two years later it was found in the possession of an Italian in Florence, and was restored to its French resting place.

The Famous 'Last Supper'

The 'Last Supper' was painted on the refectory wall of the convent Church of Santa Maria delle Grazie at Milan. The disciples, with the Master in their midst, are represented at one side of a table, their faces to the spectator. The words, "One of you shall betray me," have just been spoken, and the picture shows in the expressions of the hearers the varied effects of the announcement. The furnishings of the chamber are very simple; no decorative figures have been added, the background is a wall with three windows through which, at a distance, a landscape is seen. There is nothing to detract from the dramatic interest of the situation. For a time this world-famous picture, because of the manner in which the colors were applied to the wall, and because of the neglect to which it was subjected, was almost reduced to ruin. At the beginning of the 20th century, however, it was skilfully restored to something of its original splendor.

Da Vinci as a sculptor must be judged from report only. The great equestrian statue he designed and modeled as a monument for the house of Sforza in Milan was never executed. For three years the colossal plaster model 26 feet high stood in the courtyard of Castello, exciting admiration and extravagant praise from all who saw it. The great task of casting the monument in bronze was barely under way when Ludovico il Moro was overthrown by the French. The great statue then became the target of Gascon archers and was soon destroyed. From the report of contemporaries and from sketches left by the artist it would seem that this statue, if completed, would have rivaled any equestrian statue in the world.

VINEGAR. "Sour wine" is the meaning of the word vinegar, and sour wine is what one variety of vinegar is. Wine vinegar is made by exposing fermented grape juice to the air until the alcohol has been changed into acetic acid. In the United States much vinegar is made similarly from fermented apple juice, or cider, but a malt vinegar is also made from fermented malt. Cider vinegar is preferred in the United States.

The characteristic sharp sour taste is given by the acetic acid, which is usually present in the proportion of four to eight per cent. The various colors and flavors depend on the kind of liquid from which it is made. You have often seen a sort of gelatinous scum in the vinegar bottle. This is the "mother of vinegar," or ferment which changes the alcohol into acetic acid.

The process of fermentation is usually hastened in the commercial manufacture by pouring the alcoholic liquid into a cask or vat filled with purified beech-wood shavings, which have been soaked in strong vinegar. As the liquid soaks down through the shavings it is rapidly fermented, since large surfaces are thus exposed to the air. The liquor that filters through is poured in at the top again and again, until practically all the alcohol has been changed into acetic acid. Home-made vinegar is often produced by putting the vinegar plant into a weak solution of sugar or molasses.

There are Federal laws establishing standards for the various vinegars. It is very easy and cheap to use a little dilute sulphuric acid and color the product to look like vinegar, and this was often done before the enactment of the United States pure food laws. Vinegar should never be kept in metal vessels, because acetic acid reacts with the metal and "eats" it away. It forms lead acetate, a poison, if there is any lead present. (*See Fermentation.*)

VIOLET. Snuggled beneath a blanket of fallen leaves in cool woods the modest little violet sleeps until spring. Then it awakes and we find, in place of a blanket of leaves, a covering of such flowers that—

One might guess

A storm of blossoms had fallen there
And covered the ground with a sweet excess.

The common blue violet is found wild in woodlands, meadows, and marsh from Nova Scotia to Minnesota and southward to Georgia and Kansas, during April, May, and June. Other species, such as the round-

leaved violet, the sweet white violet, and the Canada violet, also grow wild. The familiar pansy is a cultivated form of a European species of violet (see Pansy). The sweet violet (*Viola odorata*) is the parent of the varieties which are grown in green-houses and rank among the most important commercial flowers. The dog's-tooth violet, or adder's tongue, is not a violet at all, but is a member of the lily family.

So dear to the hearts of everyone is the modest little violet that several states have adopted it as their floral emblem. Napoleon was fond of it, and in Paris the statues commemorating the loss of Alsace-Lorraine were decorated annually with violets.

Scientific name of common blue violet, *Viola cucullata*. Flowers solitary on scapes, 5 unequal petals, and 5 sepals extended into ears at the base. Leaves large, dark green, heart-shaped, growing on petioles.

The STRINGS that Sing with HUMAN TONES

The Most Sympathetic of All Musical Instruments, the Violin—Only After Long and Loving Association with Human Beings Does It Utter Its Richest, Tenderest Notes

VIOLIN. For sweetness and richness of tone, the violin has no rival among musical instruments. The harp, piano, and organ can produce more varied effects, but a violin in the hands of a master player can be made to "sing" as can nothing else but the human voice. The violin seems almost human, too, in the complexity and delicacy of its structure, and in the fact that age and use are required to mellow it and bring it to perfection. The best artists agree that no new violin, even the most perfectly made, will produce as rich and full a tone as one that has been used for

30 or 40 years. That is why old instruments made by master artists are worth great sums.

The violin is a shell of wood with four strings of catgut stretched across a bridge on its upper side. Catgut is a tough cord made from the dried intestines of a sheep or some other animal (but not those of a cat). Sound holes on each side of the strings permit the air in the sound box to vibrate when the strings are set in motion by the friction of the bow. These vibrations produce the tone. The beauty of the tone is due not alone to the strings, but also to the

THE GREAT VIOLIN MAKER IN HIS WORK SHOP



As we look at the grave studious face of Stradivari, we feel the spirit of devotion to his art which made him the King of violin-makers. The tools that you see, with which he wrought such marvels, were bequeathed to him by his beloved master, Amati.

delicate shell-body against which the air vibrates after the strings have set it in motion. After the first violin was made, men worked more than a hundred years before they finally perfected this wonderful little sound-box.

The forerunners of the violin came from the mysterious East. According to tradition, the first stringed instrument played with a bow was invented by a king of Ceylon about 5000 B.C.; and wandering minstrels in India to this day play a strange looking two-stringed fiddle, said to be virtually the same instrument as the one of which the legend tells. The Arabs had a one-stringed fiddle, called the "rebek," which found its way to Europe some time before the 10th century of our era. Later drawings and sculptures of the Middle Ages show similar instruments with variously shaped bodies, and two, three, or more strings.

From this crude instrument of the viol family developed the violin and its larger cousins. As its Italian name shows us, the violin was perfected in Italy, where it took approximately the form we have today, in the latter half of the 16th century.

Andreas Amati, and His Priceless Handiwork

Its chief home was Cremona, a little town near Venice. Here the celebrated Andreas Amati grew up, and to him the most important thing in life was to make a perfect violin. He knew that the fineness of the tone depended on the fineness of the body, and that for a fine body he must have the finest quality of wood. So he experimented with wood from all the trees that grew in that sunny land. It is beautiful to read how those who worked with him were as interested as he himself in the task he set out to accomplish. They not only found the finest wood but also discovered wonderful methods of finishing it. The violins made by Amati from 1554 to 1580, and by his nephew and pupil, Nicolo Amati, are now almost priceless treasures.

Of all the masters of that old Cremona school, the name that stands highest is that of Antonio Stradivari, who was first a pupil, then a master there. As a boy, he studied and worked and experimented, as the Amatis had done. His special contribution was to make all the curves and arches of the violin body most delicate, and yet strong and resonant. He chose, for this quality, the wood of a certain pine that grew on the hillsides near the town. He then experimented with the oils and different finishes until he created a varnish that gave the body the rich color of amber. The secret of this perfect varnish seems to have been lost, for since the days of Stradivari, no such violins have been made. It almost seems as if his great devotion to his task were in some way ingrained into the very fiber of the material he used. It is said that he was grave, gentle, and dignified, slow of speech and of manner, except when his beloved violins were concerned; then he was swift as lightning, and exacting into the smallest detail. In the later years of his life he would not allow his name to be signed to the instruments he made, fearing that his failing eyesight might have permitted the slightest flaw to pass un-

noticed. More than 1,000 violins, violas, and 'cellos still exist bearing the master's name, most of them made between 1690 and 1730. Hundreds of spurious instruments have also been constructed in exact imitation, even to the label.

Of the other masters who wrought at Cremona the greatest was Giuseppe Antonio Guarneri (known as Guarneri del Gesu), a member of another celebrated family of violin-makers. Some of his work was inferior, but the best of it is considered by some to equal that of Stradivari.

How the Violin is "Taught" to Sing

About seventy pieces of wood go to the making of a violin. The wood must be chosen, seasoned, and shaped with the greatest care, so it will not warp. It is held together only by glue. For the "belly," as the top of the sounding-box is called, pine and silver fir are used almost entirely, because of their great elasticity. Maple is generally used for the back, sides, bridge, and neck. The richness of tone depends on the mathematical exactness with which the proportions are distributed, and the size and positions of the curiously shaped sound-holes. Horse-hair is used for the bow, because each hair has many minute bristles pointing away from the root. It is these minute bristles that give the bow its "bite," thus setting the violin strings in vibration. From 175 to 250 hairs are laid side by side, half pointing in one direction and half in the other.

The violin has remained virtually unchanged in shape or substance for three centuries. In that time the harpsichord, lute, and spinet have passed away, the harp has been improved, the piano has been invented and developed. But the violin, which took a hundred years to assume its form, remains today what it became in the days of the great Stradivari.

In the same family with the violin are also the *viola*, an instrument of the same shape and about one-fifth larger than the violin; the *violoncello*, of the same shape, but so much larger that it rests on the floor and is held between the knees of the seated player; and the *double bass*, whose deep voice is the bass of the whole orchestra. The instruments of this group are often referred to as "the strings," and they are really the backbone of the orchestra, outnumbering all the other instruments put together.

VIPERS. Leadership in the serpent family is held by the vipers because of the exquisite perfection of their poison apparatus. They are usually divided into two groups: "true vipers" and "pit vipers." The latter group, which includes the rattlesnake, copperhead, and water moccasin, is distinguished by a deep cavity or pit between the eye and the nose. This pit, lined with highly sensitized skin, is a heat-wave detector which helps to locate warm-blooded animals and guides the snake in striking.

The cobras and a few other snakes possess a poison more powerful than that of the vipers, but the latter have jaws and fangs far better suited to injecting their deadly venom deep into the flesh of their victims.

Their fangs are longer, and, instead of the deep groove on the front side, as in the cobras, a tube or canal leads from the poison glands through the tooth itself to a spot near the sharp tip. Unlike other poisonous snakes, also, the vipers are able to erect that part of their upper jaw which holds the fangs, thus bringing these weapons into more dangerous prominence.

Among the best known of the 40 or more species of "true vipers" are the following: the common viper, adder, or *kreuzotter* of Europe, whose bite is not as a rule fatal; the sand viper, which bears a fleshy horn upon its nose; the puff-adder of northern Africa, which inflates its body and hisses loudly when approached; the horned viper, also of northern Africa, which has a horny spike over each eye and which is believed to have caused the death of Cleopatra; and the "daboia" or Russell's viper, which is the largest and most poisonous of the group, reaching a length of five feet, and which is one of the scourges of India and neighboring countries. With the exception of one African genus, all vipers bring forth living young. No true vipers are found in America, which is essentially the home of the pit vipers, of which there are about 60 species, all of them highly poisonous. (See Snakes).

VIREO. The Latin word *vireo* means "I am green," but the birds of this family are so in name only, for their coloration is chiefly plain olive, whitish, or buff-yellow, with only sometimes green, yellow, or blue on the head. They are small, active, tree-living

birds, about 70 species of them, found only in America, especially in the tropical regions.

Though eating some fruit, vireos (or "greenlets," as they are also called) are mainly insectivorous, finding their food amid the foliage of shrubs and trees. Most of the species have an oft-repeated musical call that places them among the class of singing birds, though the three- or four-note phrases can hardly be called a song. The nesting habits of the various species are similar. The small, cup-shaped, semi-hanging nest is secured to a forked tree branch and finely wrought of mosses, lichens, and fibers. The white eggs are spotted and from three to five in number.

The red-eyed vireo, common throughout the United States except in the arid districts, is well known because of its persistent call which, with its manner of sitting in plain sight as if demanding a hearing, has given it the nickname of "preacher-bird." (For illustration in colors see Birds.) The white-eyed vireo, found in southwestern United States and Mexico, is an always clever and amusing character of birdland. Its call has been variously translated; "whip-Tom-Kelly" is the most popular word equivalent. The blue-headed vireo has a cap of slate-gray and is found in the forests of eastern America. Its appetite for caterpillars has won for it the title of "conservator of the forests."

Scientific name of red-eyed vireo, *Vireo olivaceus*; of white-eyed vireo, *Vireo griseus*; of blue-headed vireo, *Vireo solitarius*.

The "OLD DOMINION"—Mother of Presidents

VIRGINIA. Soaking in Atlantic brine from latitude 36° 30' to 38° 30' is a knotted fringe of peninsulas, each tassel in its turn fraying out into lesser peninsulas. This is tidewater Virginia, flat and in places swampy, the fringe on the robe of the "Mother of Presidents."

The branching bays which make the Virginia coast a "sylvan Venice" are in fact, geologists tell us, "drowned river valleys." They testify to a time when the present lands, now barely lifted above sea-level, stood much higher than at present. The spill of the coast eastward into the Atlantic left the Dismal Swamp region (with Lake Drummond the center) covered with fresh water, made all the important streams navigable part way, and created in Hampton Roads one of the finest harbors along the Atlantic coast of the United States.

A Private Seaport for Every Plantation

Curiously enough, this very accessibility of tide-water Virginia was one factor which hindered its commercial development. The early plantations bordered on navigable water, and each, as a rule, had

Extent.—North to south, greatest distance, about 200 miles; east to west, 432 miles. Area, 40,815, of which 916 square miles are water. Population (1940 census), 2,677,773.

Natural Features.—Island fringed Coastal Plain, crossed by rivers, Piedmont rising to Blue Ridge (Mount Rogers, 5,719 feet); valley of Virginia between the Blue Ridge and the Alleghenies, forming the western boundary; Dismal Swamp, southeast; Luray Cavern and Natural Bridge in the valley. Principal rivers: Potomac, Rappahannock, York, James, and Roanoke. Mean annual temperature, 56°; mean annual precipitation, 42".

Products.—Corn, vegetables, tobacco, peanuts, apples, hay, wheat; cattle and dairy products; poultry, hogs; oysters, fish; coal, clay, stone, iron; cigarettes, rayon and cotton textiles, chemicals, paper, pulp, furniture, lumber.

Cities.—Richmond (capital, 193,042), Norfolk (144,332), Roanoke (69,287), Portsmouth (50,745), Lynchburg (44,541).

its own wharf where sea-going vessels might load. Any planter might become a trader on his own account, and some did, but only in a small way, for the profits on this scattered trade were not great enough to induce them to forsake the easy gains of tobacco-

raising. Thus there was no encouragement to the growth of a merchant class; towns and markets had no territory from which to draw trade until the back country was settled, and not only New York but also Boston, Philadelphia, and Baltimore grew into important ports while Norfolk and its splendid harbor were passed by.

Back of tidewater, the Virginia portion of the great coastal plain rises gently to an elevation of 150 to 300 feet. This, settled next after tidewater, was the region of vast baronial estates in colonial days.

Next westward comes the Piedmont belt, where spurs and broken ranges of the Blue Ridge run out into the gently rolling plain, as lower down the peninsulas project into the ocean. These spurs are separated, not by bays, but by innumerable valleys of all forms.

which here and there spread out into plains. This was the extreme frontier of "Ole Virginny" until the middle of the 18th century, peopled not by wealthy planters and their slaves, but by hardy pioneer farmers, the first frontiersmen.

Higher up again are the ranges of the Blue Ridge Mountains, running from northeast to southwest, and widening toward the south. The early colonists believed them impassable, and the first explorers to ascend the ridge turned back discouraged at the sight of yet other ranges looming up to the west; but the Virginia mountains, though majestic and beautiful, are comfortable, approachable giants with well-cushioned bones—not gaunt and forbidding, like some of the more southern Appalachians. The crest of the Blue Ridge from Waynesboro north to Front Royal has been set aside as the Shenandoah National Park (*see* National Parks). The highest point in the Blue Ridge is Mount Rogers, 5,719 feet above sea level.

West of the Blue Ridge is the valley of Virginia, which is the central portion of the greater Appalachian valley. As the great peninsulas of the coast are seamed by rivers into minor peninsulas, so the Great Valley is seamed by lesser ridges into the minor valleys of the Shenandoah, the James, the Roanoke, the New, and the Holston rivers. This region, which Washington predicted would become "the garden of America," is the most fertile portion of Virginia. Yet, because it was comparatively inaccessible from the southeast, it was settled largely by immigrants of German and Scotch-Irish stock who pushed down the valley from Pennsylvania. West of this again are the long crumpled ridges of the newer Appalachians.

Interesting features of the whole region west of the coastal plain are the numerous mineral springs and limestone caverns, such as the beautiful Luray, Shenandoah, and Endless caverns (*see* Cave). The Natural Bridge, near Lexington, is a mass of rock which spans Cedar Creek at a height of 215 feet above the stream. It is about 50 feet thick and 90 feet long, and is wide enough to carry a main highway. During the Revolutionary War it was used as a tower for the manufacture of shot.

Although the abundant local pride of Virginia does not seem to center around its rivers—perhaps there are too many of them—they have had an important influence on the development of the people. Five-sixths of the state is drained by five navigable streams, the Potomac, the Rappahannock, the York, the

James, and the Roanoke or Staunton. While these, in colonial days, brought London to the planter's front door, so to speak, they and their tributaries also isolated him from his next-door neighbor, for there

were few bridges or ferries. From this circumstance and from the great size of the plantations grew up the tendency for each estate to be a self-supporting unit. So persistent was the habit that not until 20 or 30 years after the Civil War, it is said, was there a bank or postal money order or express office in all rural tidewater Virginia.

Naturally, the New England town meeting, with its direct control of local affairs by close neighbors, would not work here. There were no local affairs except the affairs of the plantations, whose boundaries were often as wide as the old parish. In Virginia today, therefore, the smallest administrative unit is the county, not the township.

Virginians are perhaps more definitely a type than the citizens of any other state.

Only an insignificant fraction of the population are foreign born, and the typical Virginian counts many generations of Virginia forefathers; he is proud of being a son of the Old Dominion, whose colorful history dates back to the first permanent English settlement in America. Yet in spite of its historic atmosphere

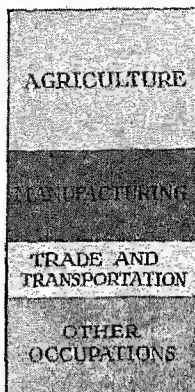
and of the traditions which connect it so closely with an earlier period, Virginia today is a progressive agricultural and industrial state. And it attracts large numbers of visitors each year, not alone because of its landmarks of the past, but because of the natural beauty of the region.

Although Virginia's early story was, so to speak, written on tobacco leaves, tobacco is no longer the leading crop; corn exceeds it in value and other crops are widely grown. Nor is Virginia the leading tobacco-raising state; Kentucky and North Carolina have surpassed it since 1900. A very

fortunate thing for Virginia was this agricultural revolution. Not only did King Tobacco tax the land so exorbitantly as to exhaust it; he was a jealous tyrant who prevented the development of other resources.

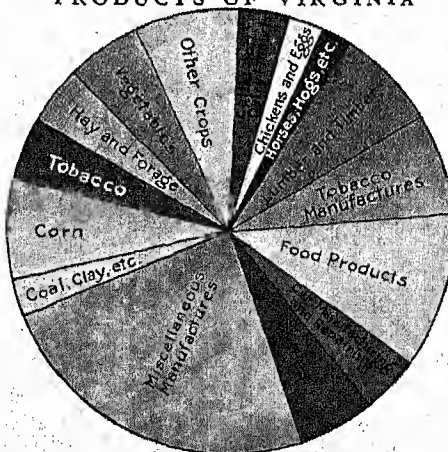
Now Virginia boasts of being one of the great truck-growing states in the Union and one of the greatest peanut-growing states; both industries center around Norfolk. Many parts of the valley of Virginia are vast apple orchards. The Albemarle pippin, now a popular variety, originated here.

The fisheries, especially the oyster fisheries, are important. The Lynnhaven Bay oyster is said to be



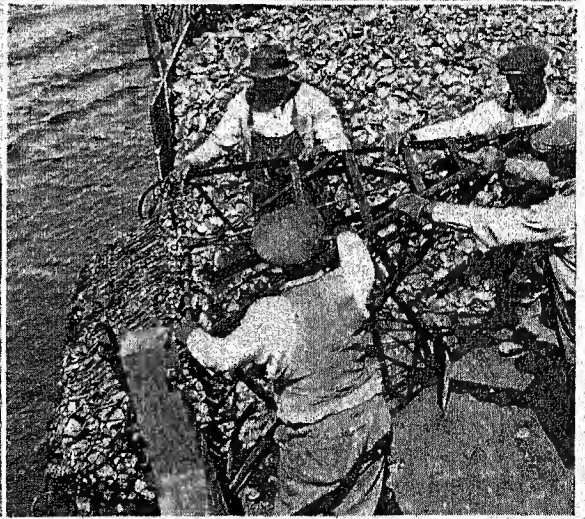
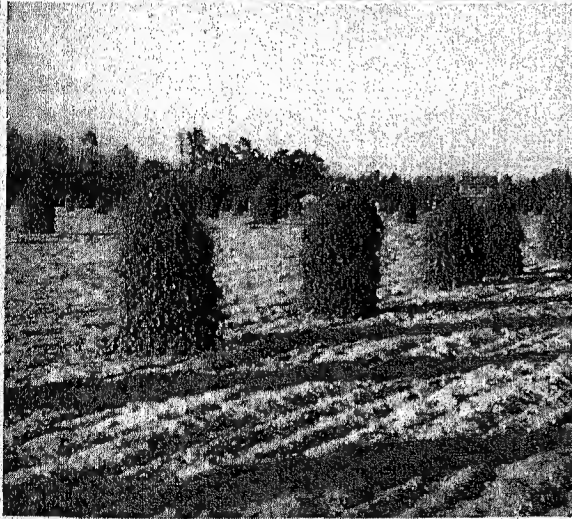
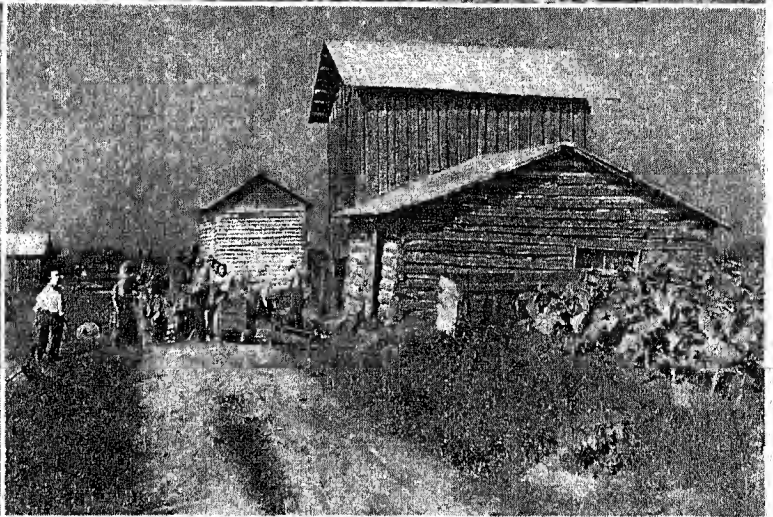
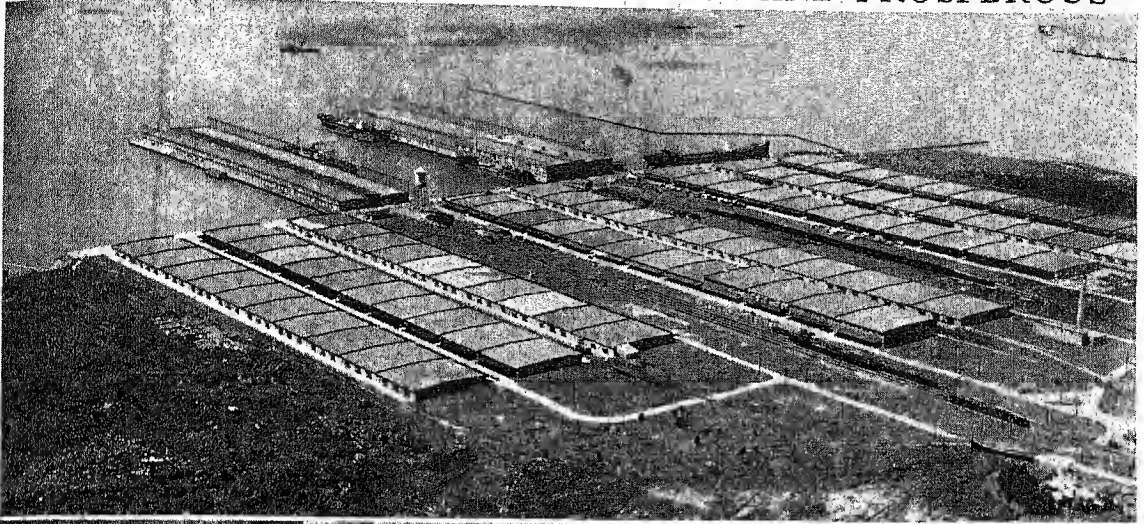
How the chief occupations of the people compare in Virginia.

PRODUCTS OF VIRGINIA



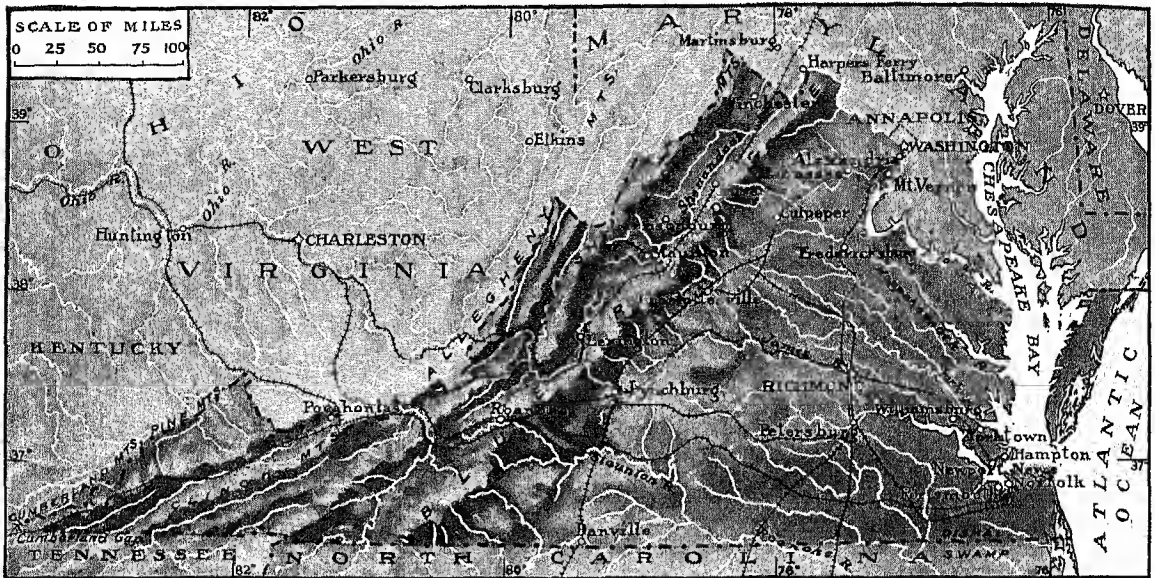
The state's recent industrial progress is shown by the high proportion of manufactures.

WHY THE "OLD DOMINION" IS BUSY AND PROSPEROUS



In the top picture we see the great piers, warehouses, and freight classification yards of the Norfolk Tidewater Terminals, used in both World Wars as a base for the shipping of supplies to forces overseas. Grading apples (left center) is an important task in a state in which fruit growing is a principal industry. Tobacco, the largest money crop, is grown in about two-thirds of the counties. The picture (right center) shows a farm near Danville. Peanut growing (lower left) and the manufacture of peanut products, and oystering (lower right), are leading industries in the lower Tidewater region.

THE MOUNTAINS, VALLEYS, AND COASTLINE OF VIRGINIA



A triple row of mountains outlines Virginia's western border, and pours down a network of streams across the lowlands to the sea. The broken coast with its many fine harbors has always been an important factor in developing the wealth of the state.

the largest and finest known. Nearly all of the country's soft shell crabs are taken from the Chesapeake Bay region of Virginia and Maryland.

A Great Live Stock and Lumber Region

The western portion of the state is a hay-raising and grazing section. Especially fine horses are raised in the Shenandoah Valley. Appalachian Virginia claims to be the only section of the United States which ships cattle direct from the blue-grass pasture fields to foreign ports. The Blue Ridge has more live stock to the square mile than any other section.

Although the forests of the state have been steadily cut for many years, there is considerable production of timber and lumber, especially hardwoods from the Blue Ridge and Appalachian regions. The accessibility of hemlock and oak forests, which provide bark for tanning, and the proximity of a cattle-raising section have made Lynchburg an important leather and shoe manufacturing center, as well as one of the state's leading railroad centers.

Minerals and Manufactures

The first gold and the first coal mined in the United States came from Virginia. The gold production (all in a belt running from the Potomac to Halifax County) is insignificant, but the coal (all in the Appalachian region) is an important factor in the state's industrial progress. The famous Pocahontas bed produces one of the most valuable grades of coking and steam coal. Virginia's production of iron, important after the Revolution, declined in the middle of the 19th century, but increased again with the development of railroad facilities and the discovery of high-grade ores in the southwestern part of the state. Today iron mining is insignificant. Only a small amount of brown ore is produced, for use in the manufacture of hydrogen gas. Among the other minerals extracted are

clay, soapstone, pyrites for the manufacture of sulphuric acid, and limestone, which is used for making cement and lime and as a flux in the iron and steel industry.

Within the last few years the "Old Dominion" has become a new dominion of industry. Huge plants have been built for the manufacture of rayon and chemicals and for the fixation of atmospheric nitrogen. The leading products are tobacco manufactures, cotton goods, rayon, furniture and other lumber manufactures, iron and machinery, meat products, automobile accessories, fertilizers, paper and pulp, ships, leather, and chemicals.

Great Cities of Virginia

Richmond is the capital and chief city (see Richmond). Norfolk is the largest of a cluster of cities (Portsmouth, Newport News, and Hampton) on the harbor of Hampton Roads in the mouth of Chesapeake Bay (see Norfolk). Roanoke, in the western part of the state, the third city, owes its origin to the establishment of a railroad terminal and repair shops in the 1880's. It also has great cellulose factories and rayon mills. Hopewell, 25 miles below Richmond on the James River, is famous for its sudden growth as a manufacturing center during and after the World War of 1914-18. Lynchburg, on the upper reaches of the James, is a great tobacco market and has a number of industries.

Staunton, in the Shenandoah Valley, another manufacturing city, is the birthplace of Woodrow Wilson. It is the seat of Mary Baldwin College and Staunton Military Academy. Winchester, also in the Shenandoah Valley, is the distributing center for the apple orchards of Frederick County. Its annual Apple Blossom Festival attracts thousands of visitors. The homes of Thomas Jefferson and James Madison are

near Charlottesville. Danville, near the southern border, cures the bright tobacco and spins the cotton of Virginia's "Southside."

Virginia's educational expansion has kept pace with its industrial growth. The public schools have improved constantly since William H. Ruffner started the state school system in 1870. Many of the institutions of higher learning date back to colonial times, or to the early days of the republic. The state schools are the College of William and Mary, founded in 1693 at Williamsburg; the University of Virginia at Charlottesville, planned and organized by Thomas Jefferson; Virginia Military Institute at Lexington, where "Stonewall" Jackson and Matthew Fontaine Maury, the eminent geographer, were faculty members; Virginia Polytechnic Institute at Blacksburg; Medical College of Virginia at Richmond; state teachers colleges at Farmville, Fredericksburg, Harrisonburg, and East Radford; and Virginia State College for Negroes at Petersburg.

Virginia's endowed and denominational colleges include Washington and Lee University at Lexington (1749), whose name honors an endowment from George Washington and General Lee's work as the college president during the years of reconstruction; Hampden-Sidney, opened in 1776; Bridgewater College at Bridgewater; University of Richmond at Richmond; Randolph-Macon College at Ashland; Roanoke College at Salem; Lynchburg College at Lynchburg; Emory and Henry College at Emory. There are several women's colleges: Randolph-Macon Woman's College at Lynchburg; Hollins College at Hollins; Mary Baldwin College at Staunton; Sweet Briar College at Sweet Briar; and Westhampton College at Richmond. Hampton Institute at Hampton, Virginia Union University at Richmond, and the Virginia Theological Seminary at Lynchburg, are endowed schools for Negroes.

An Historic State

A trip through Virginia teaches history in its happiest form. Along the wide highways that roll from tidewater to the Alleghenies, iron markers point out the great events that each neighborhood has witnessed. Names of counties honor men who built state and nation. Cities unite modern industrial and commercial prowess with historical importance.

Alexandria, across the Potomac from the nation's capital, remembers when George Washington from near-by Mount Vernon was vestryman in Christ Church, which is still standing, and attended the meetings of the old Masonic Lodge. A great Masonic memorial to him stands here. At Arlington, Lee's beautiful home overlooks the national cemetery where sleep so many heroes of America's wars. On the peninsula between the York and the James lie the Yorktown battlefield, where Cornwallis' surrender ended the Revolutionary War, and the ruins of Jamestown, first permanent English settlement in America. Both are included in the Colonial National Historical Park, as is Williamsburg, the colonial capital, which has been rebuilt in its 18th-century form.

England's "Virgin Queen," Elizabeth, set aside a vast American territory for colonization and called it "Virginia" in honor of herself. Jamestown was settled in 1607, in the reign of James I, when the London Company (later called the Virginia Company) sent three boat-loads of men to mine the gold they thought abounded on the new continent, and to seek a passage to the Pacific Ocean, which at that time was believed to be a few miles to the west.

The Leadership of Capt. John Smith

Capt. John Smith's strong leadership kept the colony from failure for a few years (*see* Smith, Captain John). After a wound sent him back to England, the settlers gave up and were sailing for home when they met Lord Delaware's ships in the Bay, bringing new supplies and colonists. Sir Thomas Dale, the iron governor, came in 1616, to keep the citizens at work raising food, and to give each one a small piece of land for his own crops. Crops meant money by this time, for John Rolfe, who married the Indian princess, Pocahontas, found that England paid well for Virginia tobacco. (*See* American Colonies; Jamestown.)

Sir Edwin Sandys became treasurer of the Virginia Company in 1618, and the next year he sent out Sir George Yeardley, a liberal governor, with a new charter allowing free colonists 50 acres of land, and setting up a House of Burgesses to represent the planters. That year two boat-loads of young women arrived as brides for the lonely colonists. Each man paid 120 pounds of tobacco for his wife's passage. Plantations reached up the James to the Falls by 1622, but of the 4,000 settlers who had come to Virginia, only 1,200 remained, and nearly 350 lost their lives in the Indian massacres that year.

The king revoked the Company's charter in 1624 and sent out his own governors. Sir William Berkeley, who ruled from 1642 to 1652, and again from 1660 to 1676, kept the colonists loyal to the Stuart kings. They offered Charles II a refuge in America, and after he gained his throne he referred to Virginia as his "Old Dominion"—a name it keeps to this day.

Governor Berkeley favored the rich planters of the tidewater, and kept the same House of Burgesses for the 16 years of his second term by setting up a sort of ruling aristocracy. When the Indians went on a rampage in 1675—for the first time since the massacres under Chief Opechancanough in 1622 and 1644—the governor failed to protect the scattered cabins of the small farmers in the piedmont. The settlers rose under Nathaniel Bacon and put down the Indians, then they turned against the governor, burning Jamestown, his capital (*see* Bacon, Nathaniel), and destroying the old church and other landmarks of Virginia's first settlement. The capital was moved to Williamsburg in 1699.

Slaves Make Plantation Owners Rich

As years went by, wealth accumulated rapidly on the great tidewater plantations, where negro slaves brought from Africa raised immense crops of tobacco. Proud mansions graced the river banks, and glittering coaches carried happy parties clad in imported silks

and satins to dances, fox-hunts, races, and other gay affairs, or to church on Sunday.

Farms were smaller and slaves fewer in the piedmont, and across the Blue Ridge, where the German and Scotch-Irish settlers had filtered into the Shenandoah Valley; but newly cleared acres provided bountiful crops even here, and the farmers were lifting new brick or frame houses to replace their log cabins.

Mountaineers in homespun and deerskin rode horseback—wife or child perched behind the saddle—to “barn raisings,” dances, or other frontier amusements. Their cabins were often built near a fort or stockade, for Indian raids were a constant menace on the frontier. By surprise attacks the Indians sometimes captured women and children. Isabel Stockton, Hannah Dennis, and Mary Draper Ingles returned from such captivity with thrilling and harrowing stories. The fierce-fighting men of Virginia were called “Long Knives” by the Indians. Among these famous fighters were Christopher Gist, Ebenezer Zane, Lewis Wetzel, John Sevier, and Charles Lewis—the last of whom was killed when his brother, Gen. Andrew Lewis, led the Virginia rangers against the Shawnees under Chief Cornstalk in the battle of Point Pleasant (now in West Virginia) on Oct. 10, 1774.

The King Angers the Virginians

English kings had profited richly by the prosperity of Virginia. Governors collected taxes with a heavy hand, and between 1673 and 1684, Charles II had made Lord Arlington and Lord Culpeper proprietors of the colony. Among the nobles with large tracts of land was Lord Thomas Fairfax, heir to Lord Culpeper, who sent out George Washington to survey his wilderness territory west of the mountains, and prepared Washington for his service there in the French and Indian War (*see* French and Indian War; Washington, George).

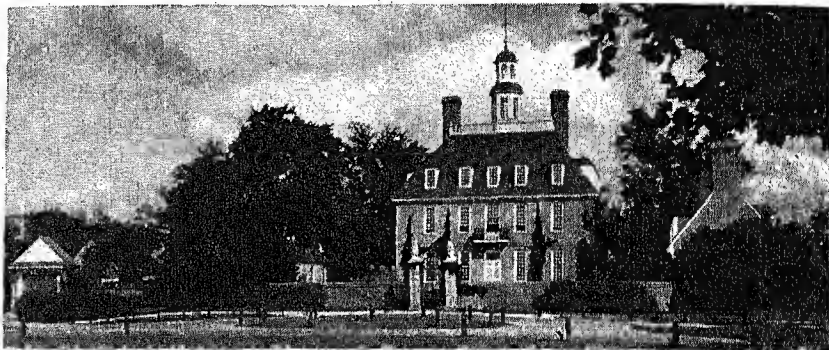
England's policy of parliamentary taxation, begun in 1764, angered tidewater and piedmont alike. These sections vied with each other in producing Revolutionary leaders. The House of Burgesses protested against each taxing law, until the assembly was dissolved by the governor. Patrick Henry's ringing speech against the Stamp Act echoed far and wide through the colonies (*see* Henry, Patrick).

Virginia patriots held five successive conventions in which they formed committees of correspondence and committees of safety, appointed members to the Continental Congress, and, in May 1776, passed a resolution asking Congress for a Declaration of Independence. Their delegate, Richard Henry Lee, made

the motion for this action, and the great document was written chiefly by another Virginia delegate, Thomas Jefferson. The state convention accepted George Mason's Virginia Declaration of Rights on June 22, adopted the new state constitution on June 29, and passed Jefferson's acts for religious freedom and abolition of the law of entail (*see* Jefferson, Thomas).

While Virginia's statesmen were founding state and nation, its soldiers were defending their freedom.

THE GOVERNOR'S PALACE IN COLONIAL WILLIAMSBURG



Williamsburg was restored by John D. Rockefeller, Jr., to preserve an historic city of the colonial period. It was founded as Middle Plantation in 1633, and from 1699 to 1779 was the capital of the colony of Virginia. The Governor's Palace, like the other buildings, has been reconstructed upon its original foundations with the guidance of contemporary drawings and other records. Williamsburg is now a part of the Colonial National Historical Park.

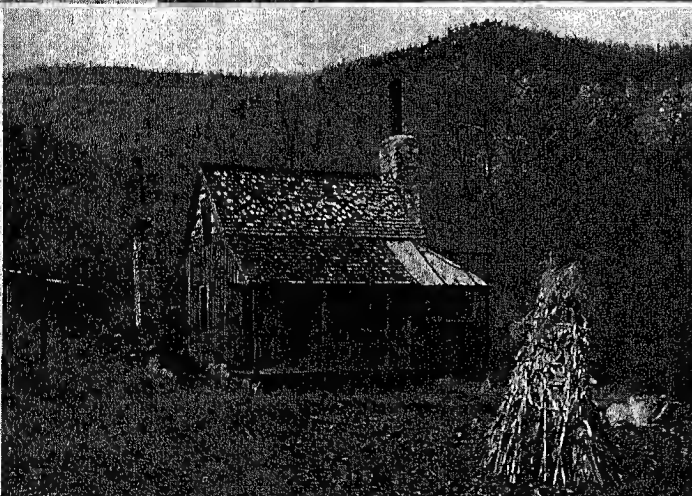
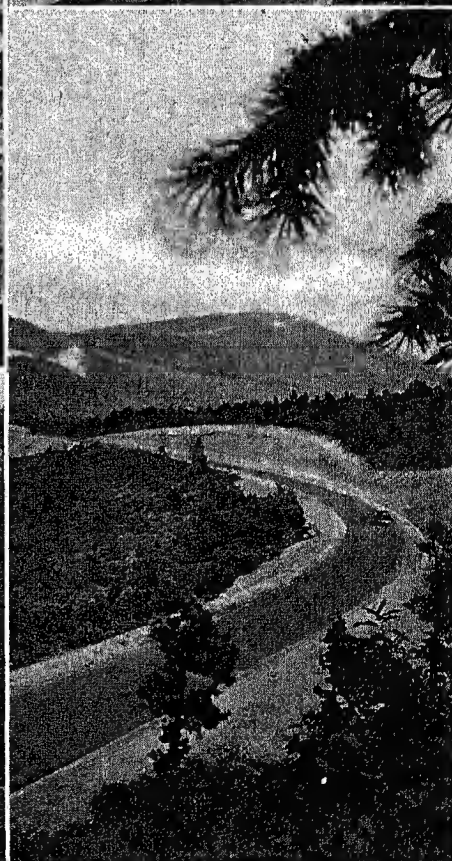
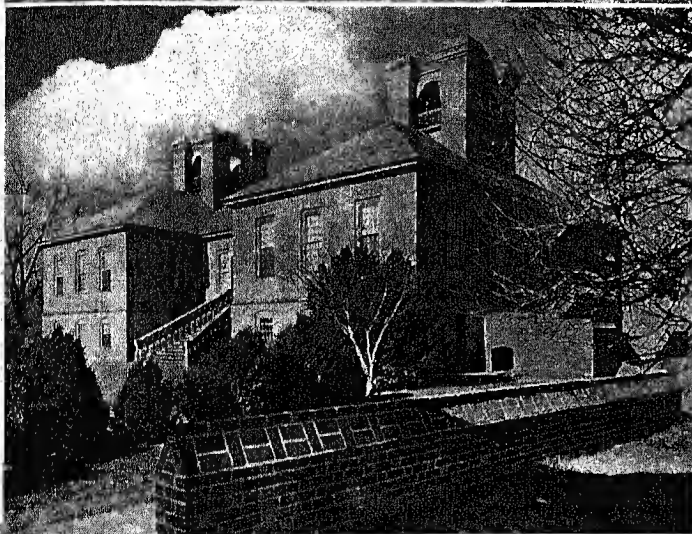
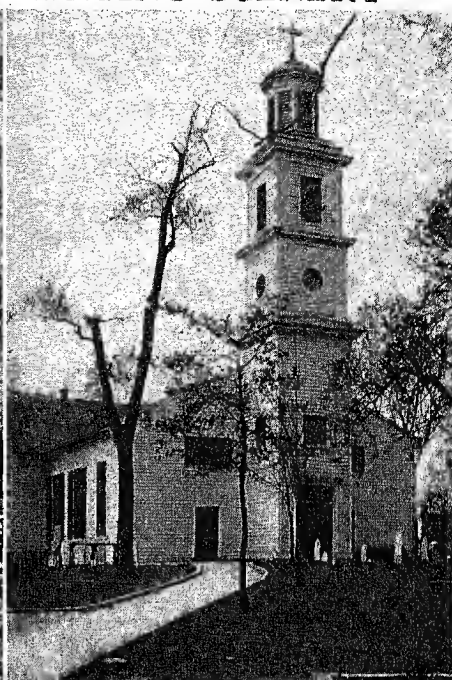
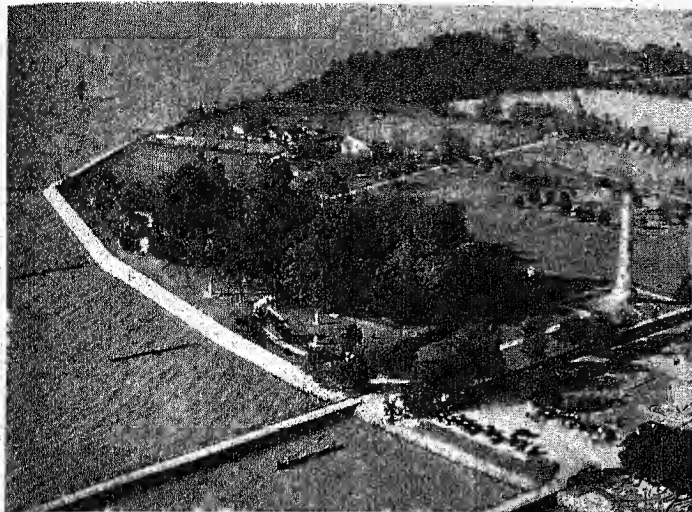
George Washington, the commander-in-chief, Gen. Andrew Lewis, “Light Horse Harry” Lee, Gen. Daniel Morgan, Gen. George Rogers Clark, whose frontier troops saved the West, Col. William Campbell, and thousands of others—from general to private—played hero roles in the bitter struggle that ended at Yorktown.

When a new national Constitution was drafted in 1787, seven Virginians—George Washington, George Mason, James Madison (*see* Madison, James), John Blair, George Wythe, James McClurg, and Edmund Randolph—had a large share in the work. John Marshall, for 34 years chief justice of the United States Supreme Court, explained and shaped this Constitution through his decisions. Eight sons of Virginia took the oath to defend this Constitution when they became president of their country—Washington, Jefferson, Madison, Monroe (*see* Monroe, James), William Henry Harrison, John Tyler, Zachary Taylor, and Woodrow Wilson. Of these, however, Harrison, Taylor, and Wilson won most of their fame in other states.

Land Ceded for Other States

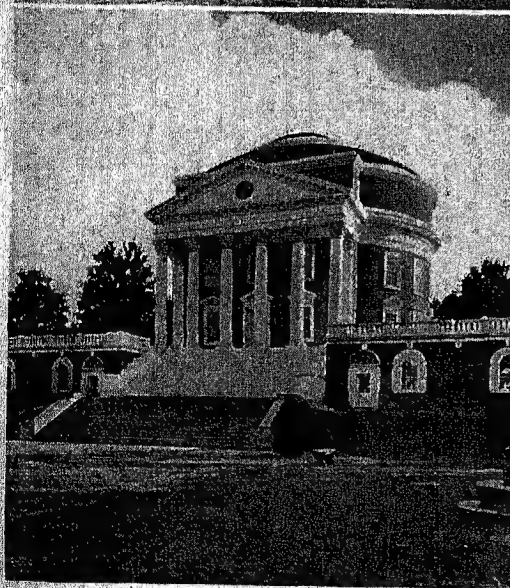
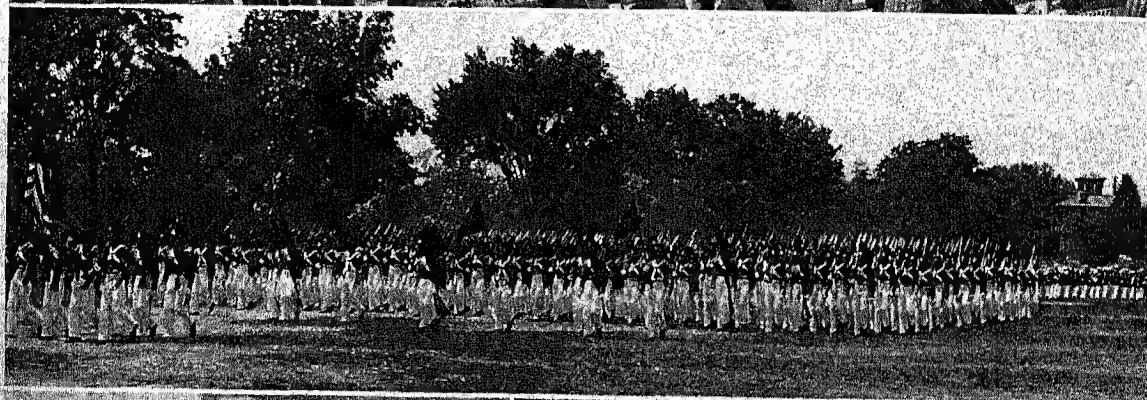
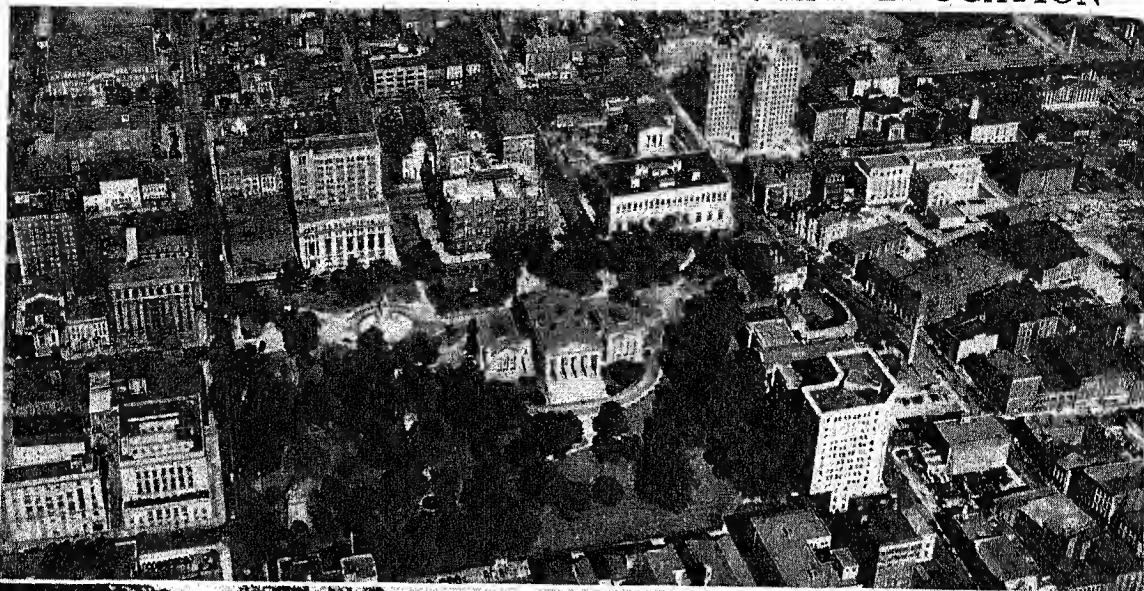
“The Mother of Presidents” has also been called the “Mother of States” because of the many commonwealths that have grown from the wide western territory that belonged to the Virginia colony. In 1784, the young state ceded this frontier land to the Federal government as part of the Northwest Territory. Kentucky was carved from Virginia territory, and West Virginia separated from the mother state when Virginia seceded from the Union before the Civil War.

HISTORIC MEMORIALS AND ENCHANTING SCENERY



On Jamestown Island (upper left) the first permanent English settlement in America was founded in 1607. In St. John's Church, Richmond (upper right), Patrick Henry in 1775 delivered his famous oration which ended with the words "give me liberty or give me death!" Stratford (center) was the birthplace of Robert E. Lee. Back in the foothills are many families who still live in simple pioneer fashion (lower left). The Skyline Drive (lower right), along the crest of the Blue Ridge Mountains in Shenandoah National Park, commands magnificent views of valleys, farmlands, and distant mountains.

FAMOUS CENTERS OF GOVERNMENT AND EDUCATION



Capitol Square in Richmond (top) is one of the most impressive governmental centers in the United States. The main part of the Capitol in the center of the Square was designed by Thomas Jefferson. Jefferson also designed the original buildings of the University of Virginia at Charlottesville, of which the Rotunda is shown at the lower left. The buildings of Washington and Lee University (lower right) date from about 1824. Gen. Robert E. Lee was president here from 1865 to 1870. The cadets in the picture above are drilling on the parade ground of the Virginia Military Institute, also at Lexington. (Top photo by Fairchild Aerial Surveys.)

In the years that followed the founding of the nation, Virginia grew in prosperity and influence. The state produced such statesmen as Henry Clay (see Clay, Henry) and John Randolph who played leading rôles in national affairs; it produced also James Rumsey, whose steamboat first churned the waters of the Potomac in 1787, and Cyrus McCormick, inventor of the reaper.

John Brown's raid at Harpers Ferry (now in West Virginia) in 1859 almost forced the crisis that caused the Civil War; but Virginia did not secede until President Lincoln issued a call for troops to coerce the seceding states. Then the Confederacy established its capital at Richmond, and thus made Virginia the chief battleground of the war. In the semicircle around this capital—north, east, and south—lie blood-soaked battlefields, where Gray defended and Blue attacked. In the bitter years of that war, Virginia's sons again proved heroes. General Lee was in command for the South, with J. E. B. Stuart and his fast cavalry an able aid. "Stonewall" Jackson (see Jackson, Thomas Jonathan), who was born near Clarksburg, W. Va., and won a series of brilliant engagements in the Shenandoah Valley in 1862, is regarded as one of America's greatest generals.

After the war Virginia had to rebuild on war-torn foundations. Today its busy factories and rich fields; its well-built towns and cities sprinkled with schools and churches; its rolling green countryside laced with fine highways; its wealth in these and countless other resources, bespeak the success of this rebuilding.

Virginia's present constitution was adopted in 1902 and provides for a legislature consisting of a senate elected for a term of four years, and a house of delegates elected for two years. The chief executive officers—governor, lieutenant governor, and attorney general—are elected every four years.

VIRGINIA CREEPER. This beautiful creeping vine, often called American woodbine or American ivy, is found in nearly all parts of America, either wild or cultivated as a porch climber. It is especially attractive in autumn, when its leaves take on a vivid coloring of gold and crimson. With its strong tendrils this plant has the power of fixing itself firmly to walls and trees. The flat disks at the end of the tendrils secrete a cement-like substance so strong that a single tendril with five branches will hold up a weight of ten pounds. The Virginia creeper is often mistaken for poison ivy, but can be easily distinguished by the fact that the leaves of the former are made up of five leaflets, while the latter are three-parted.

Scientific name, *Parthenocissus quinquefolia*. Flowers yellowish green, branching clusters, insignificant. Leaf composed of 5 leaflets, glossy green, turning to bright yellow and red in autumn, elliptical, outer half coarsely toothed. Berry small, round, dark purple.

VIRGIN ISLANDS. Forty miles east of Puerto Rico lies a group of picturesque islands, forming a bow with its convex side stretching into the Atlantic Ocean and its concave side washed by the Caribbean Sea. They are the Virgin Islands of the West Indies. Three of

the largest are St. Croix, St. Thomas, and St. John, which have a total area of 133 square miles. Standing at a gateway to the Caribbean Sea, they have value as naval stations. This strategic importance was recognized by President Lincoln, who sought to buy them from Denmark as outposts of United States defense. But the purchase was not made till 1916, when Congress bought these with some 45 smaller near-by islands for \$25,000,000. They were occupied in 1917. On St. Thomas are an air base and a submarine base.

Once busy ports in the days of New World colonization, the islands are now drowsy. Their mild climate and old-fashioned charm have brought a considerable tourist industry. The principal exports are sugar, rum, bay rum, and cattle. The islands are administered by the Department of the Interior, with a governor appointed by the president. Local laws are enacted by a legislative assembly. The largest town and chief port is picturesque Charlotte Amalie, on St. Thomas. The population of the islands (1940 census) is 24,889, 69 per cent being Negroes, and the rest whites or of mixed blood.

The Virgin Islands, which form a part of the Leeward chain, were discovered by Columbus in 1493. He named them in honor of the virgins of St. Ursula. About 30 islands are owned by Great Britain. These have a total area of 58 square miles and a population of about 6,000.

VISTULA RIVER. Like a giant letter "S," this river of central Europe flows some 650 miles from its source near the Moravian Gate in the Carpathian Mountains to its delta close to Danzig on the Baltic Sea.

With its branches, the Vistula drains a basin of some 74,000 square miles, about the area of New England plus New Jersey. From its mountain headwaters, about 3,600 feet above sea level it falls sharply some 2,500 feet within a few miles to enter the low plateau bordering the Carpathians. Thence the river meanders northward across the broad plains of central Poland to the sea.

Along its upper reaches, the Vistula passes through the rich mining and industrial areas of Upper Silesia and southwestern Poland, a region where coal, lead, zinc, and iron ore are abundant. Near the ancient city of Cracow, head of navigation on the river, it passes great salt mines. In its central section it threads its way through country which is almost entirely agricultural. Here grow wheat, rye, oats, corn, and great crops of sugar beets and potatoes. Here also cattle, horses, and hogs are raised. Beyond the city of Warsaw the river enters great timber forests and these in turn give way once again to the fertile farming land of the delta.

Dredging and the building of dikes in the delta region have improved river transportation, but navigation remains difficult because of continual deposits of silt and shifting sand bars. In spring or after heavy rains floods are frequent and dangerous. Hence the Vistula is not the great traffic artery it could be.

The most important tributaries are the Bug, the San, and the Pilica. Canals connect the Vistula with the Oder, and the Bug with the Pripiet.

VITAMINS—Regulators of GROWTH and STRENGTH

VITAMINS. "Tremendous trifles" would be a good title for an essay on vitamins. Few things on earth do so much with so little. They are necessary to the life, growth, and health of living things. Yet the amount of all the vitamins required each day by a grown man is less than a grain of rice.

Vitamins are not foods in the sense that they themselves turn into blood, flesh, and bone, nor in the sense that they supply us directly with energy. But they regulate the building of blood, flesh, and bone, and the production of energy from the food we eat. The lack of them causes a great variety of disorders, from a mild weariness or a slight skin rash to serious and painful illnesses that may end in death.

Plants are the basic manufacturers of vitamins. They produce all of them in finished or semi-finished form. Animals get their vitamin requirements either directly by eating plants or indirectly by feeding on plant-eating animals. This transfer of vitamins may run through several stages. The polar bear may get his vitamins from a seal, who got them from a fish, who got them from feeding on sea plants.

In any case, all natural foods, meat and vegetables alike, contain one or more of the vitamins. Why, then, should man ever suffer for the lack of them? There are several reasons. People may not eat enough different kinds of food to get all the different vitamins they need. The vitamins may be removed from the natural foods in the course of some manufacturing process—as when wheat flour is too much refined. Or they may be lost by improper cooking. Or plants grown in worn-out soil may not contain their normal quota of vitamins.

Some people suffer from ailments that restrict their diet and a few are not able to absorb and use vitamins properly. For them, large doses of vitamins in medicinal form may be required. A number of specific diseases are also treated in this way. It is generally agreed, however, that the average person can get all the vitamins he needs by eating a variety of foods properly prepared. In this way, he will not only take care of his vitamin requirements but will also provide the balance of proteins, carbohydrates, fats, and minerals necessary to his health (see Food; Hygiene).

The existence of vitamins as separate ingredients of food was not recognized until the beginning of the 20th century. As one vitamin after another was discovered, they were identified by letters of the alphabet. Then when their chemical nature had been determined, and many of them had been manufactured synthetically, several were given more descriptive names. The story of vitamin research is one of the most interesting in the records of modern science. A survey of the principal vitamins, as we know them today, will help to emphasize the importance of that story.

Vitamin A

Vitamin A is essential to the health of the eyes. It is especially important for vision in dim light. It aids in tooth development. By stimulating the secretions which lubricate the mucous membranes that line the nose, mouth, and intestinal tract, it helps them to resist infection. Prolonged lack of this vitamin brings on the eye disease xerophthalmia.

When vitamin A is abundant in the diet of men or animals, a surplus is stored in the liver. The richest stocks are found in the livers of fish, particularly cod, halibut, and shark. The vitamin is also stored in the materials that animals produce for their young, such as milk and eggs. As the table on the next page shows, our best natural sources of vitamin A, besides liver,

are the deep green leaves of vegetables, such as kale, parsley, and unbleached lettuce; and the bright yellow or reddish vegetables and fruits, such as carrots, Hubbard squash, and apricots.

Vitamin B Complex

The substance originally named vitamin B has proved to be a mixture of compounds, now called the *vitamin B complex*. From 10 to 15 compounds make up the complex, some of which have not been fully identified. They are usually found together in foods,

though in varying amounts. The most important ones are described in the following paragraphs.

Vitamin B₁, or Thiamin. This is necessary to the normal working of the nervous system. It stimulates the appetite and aids in the digestion and utilization of foods. The lack of it produces at first nervous and emotional disturbances. Among the symptoms may be loss of appetite, fatigue, stomach and intestinal

HOW VITAMINS ARE TESTED



The laboratory technician is filling a hypodermic needle with a vitamin sample. He will test its power by injecting it into a young chicken which has been living on a diet containing all essential food elements except the vitamin in question. Vitamin manufacturing is a huge industry today.

upsets, pains in the arms and legs, and arrested growth in children. After a prolonged shortage of this vitamin, the entire nervous system degenerates and the patient suffers from the grave disease known as beriberi, a form of polyneuritis. Since this vitamin is used in the treatment of these nervous diseases, it has been called the *antineuritic factor* and *aneurin*.

Vitamin B₁ is needed for growth of plants as well as of animals. Under favorable conditions, the plants manufacture what they need for themselves. But in our fields and gardens, plants may not find all the raw materials for making an ample supply. A solution of this vitamin poured around the roots of a plant often brings astonishing results (*see Plant Life*, subhead "How Men Improve Plants").

Plants store much of the surplus vitamin in the germs and coatings of their seeds. This is lost when wheat is milled into white flour and when rice is polished for the market. White flour today is usually enriched with synthetic thiamin to make up for this loss.

Vitamin B₂, Vitamin G, or Riboflavin. All living cells need this vitamin in their chemical processes. It aids growth and promotes the vigor of the digestive and nervous systems. Even a slight shortage, if long continued, results in loss of vitality and digestive disturbances. The symptoms of a serious scarcity include inflamed eyes, and skin ailments, particularly at the angles of the mouth and nose. Needed by the body in larger amounts than thiamin, riboflavin is so widely distributed in our favorite foods that there is less danger of a shortage.

FOODS THAT SUPPLY THE CHIEF VITAMINS

VITAMIN	BEST	VERY GOOD	GOOD	
A	Liver Carrots Hubbard Squash Pumpkin Parsley Greens (vegetable tops, kale, chard, spinach, etc.) Sweet Potatoes Broccoli Apricots	Butter (summer) Peppers, green Tomatoes Green Beans Lettuce, green Peaches Prunes Cantaloupe	Kidney Margarine, enriched Egg Yolk Milk Cheese Wheat germ meal	Asparagus Green Peas Cabbage Celery Bananas
B₁ <i>Thiamin</i>	Pork Ham Yeast (dried brewer's) Wheat germ meal Soybeans, dried Bran	Heart Bread, whole wheat Walnuts, other nuts Peanuts Dried Beans, Peas, Lentils	Beef Veal Lamb Liver Kidney Poultry Oysters Milk Bread, enriched	Corn Bread Potatoes Greens Green Peas Green Limas Asparagus Cauliflower Prunes
B₂ <i>Riboflavin</i>	Liver Kidney Milk, dried	Heart Milk, whole Cheese Yeast (dried brewer's) Wheat germ meal Almonds Dried Beans, Peas, Lentils Greens	Beef Veal Pork Ham Lamb Fish Eggs Rice, brown	Peanuts Soybeans Green Beans Green Limas Asparagus Mushrooms Prunes Grapefruit
Nicotinic Acid <i>(Niacin)</i>	Liver Kidney Yeast (dried brewer's) Wheat germ meal	Beef Pork Poultry Salmon Haddock Buttermilk Bran Mushrooms	Milk Peanuts Soybeans Broccoli Greens Green Peas	Dried Peas Dried Beans Lentils Tomato Juice
C <i>Ascorbic Acid</i>	Peppers Greens Cauliflower Brussels Sprouts Broccoli Grapefruit Lemons Oranges Strawberries Cantaloupe	Cabbage Asparagus Avocado Currants	Liver Squash Pumpkin Tomatoes Green Peas Green Beans Green Limas	Potatoes Watermelons Bananas Pears Raspberries Pineapple
D	Normally this vitamin is manufactured in the skin by the ultra-violet rays in sunlight. The text tells how the lack of it among city children and others who do not get enough clear sunlight may be corrected.			

The vitamin ratings in this table are based on the findings of numerous diet experts. Because of differences in food samples, these ratings do not always agree with one another. In such cases, the food in question has been conservatively listed under the lower rating.

Milk, meats, leafy vegetables, and beans all contain generous supplies.

Nicotinic Acid or Niacin. This member of the B complex prevents and cures the distressing disease pellagra, which attacks people in famine-stricken areas or those too poor to provide for themselves a varied diet. We need not fear this disease if our meals contain lean meats, green vegetables, whole-grain foods, and dairy products. Liver and dried yeast are the richest sources of nicotinic acid. Nicotinic acid is sometimes called the P-P factor (pellagra-preventive) of the B complex.

Other members of the B complex that have been identified are *pyridoxin*, also called *vitamin B₆*; *pantothenic acid*, probably identical with *B₃*; and *inositol*. Experiments on animals show that skin ailments and other disorders arise when these are lacking in the diet. They are plentifully supplied in diets rich in the other B vitamins. Molasses, cereals, leafy vegetables, liver, heart, and kidneys are good sources.

The so-called "gray-hair vitamin" (*B_x*) gets its name from the fact that when black rats are deprived of it their fur turns gray. Chemists call it para-aminobenzoic acid. The hope that large doses of this vitamin might restore color to the gray hair of human beings has not been realized, but it has been shown that such doses interfere with the action of sulfa drugs (see Antiseptics).

Vitamin C or Ascorbic Acid

We need vitamin C in far larger quantities than other vitamins. It is not stored in the body, so we must renew our stock daily. This can be done by eating plenty of fruits and vegetables. The citrus fruits—grapefruit, oranges, lemons—are among the best for this purpose.

A mild deficiency of vitamin C may result in damage to teeth and bones and a weakening of the blood's resistance to infections. This is why physicians prescribe fruit juices for tiny infants. Extreme deficiency brings on the disease called scurvy, which begins with slight hemorrhages from the small blood vessels under the skin, spongy and bleeding gums and loose teeth, and swollen joints. If not relieved, scurvy ends in death. Fortunately, the disease is rare today, except among shipwrecked sailors, explorers, and others who cannot obtain fresh meat, vegetables, or fruit. The word "ascorbic" means anti-scurvy.

Almost always found with vitamin C is the substance called *vitamin P*, or *citrin*, which is effective in controlling hemorrhages and healing wounds. In the absence of the vitamin, the walls of the small blood vessels are easily broken and penetrated.

Vitamin D, the "Sunshine Vitamin"

Babies and little children have the greatest need for vitamin D, since it regulates the building of calcium and phosphorus into bones and teeth. If the supply is inadequate, the disease called rickets develops, the child's bones fail to harden properly and become ill-formed and brittle; and the teeth are poorly formed and decay easily.

Normally, we manufacture this vitamin for ourselves. From plant and animal foods we derive certain oily substances called sterols (chiefly ergosterol and cholesterol). They are deposited in our skin cells, and when the ultra-violet rays of the sun shine on them, the sterols turn into vitamin D. If, for lack of sunlight, we do not make enough of this vitamin for our needs, vegetable foods will not help us. Milk, butter, eggs, sardines, and canned salmon may contain small amounts, but the richest source is the oil from the liver of halibut, cod, shark, tuna, and various other fishes. These oils are therefore given to little children to protect them from rickets.

The vitamin D content of milk may be increased by irradiating it with artificial ultra-violet light or by feeding the cows irradiated yeast. Almost any oily foodstuff may be fortified with vitamin D by ultra-violet radiation.

Most deficiencies occur among people who work indoors or who live in places where smoke or fog block off the ultra-violet rays of the sun (see Ultra-Violet Rays). A certain amount of vitamin D is stored in the body, so reasonable exposure to the sun in summer is thought to produce a reserve supply to draw on during the winter months.

Some Other Vitamins

Vitamin E. This substance is found in plants, particularly in the germ of wheat and other seeds. It has been found essential to the fertility of rats and certain other animals. Its influence on the fertility of human beings has not been proved, but the pure vitamin has been used in the treatment of diseases of pregnancy and in certain muscular ailments.

Vitamin K is a substance essential to the coagulation of the blood. It is found in the green leaves of plants and in many micro-organisms. The bacteria of the intestinal tract contain abundant quantities. The manufactured vitamin or concentrates made from alfalfa are injected to prevent or stop hemorrhages. It does not, however, help those who suffer from hemophilia (hereditary bleeding).

Preserving Vitamins in Cooking and Storage

The vitamin content of foods may be destroyed during storage and cooking. The fat-soluble vitamins—A and D—are more stable than the water-soluble vitamins—the B-complex group and vitamin C.

Vitamin A is not injured by most cooking processes. It may be slowly destroyed by too long exposure to the air. Vitamin B₁ is sensitive to prolonged high temperature. Since it dissolves in water, a portion may be lost if cooking water and juices are discarded. Alkaline solutions are particularly harmful to thiamin, so baking soda should never be added to the cooking water. Riboflavin is less likely to be destroyed in cooking than thiamin. Nicotinic acid is not affected by the heat of cooking or canning, but may dissolve in the cooking water.

Heat, exposure to air, and the use of baking soda are even more harmful to vitamin C than to thiamin. Fortunately many foods rich in vitamin C are delicious

raw. When vegetables are cooked in an open kettle, much of the vitamin C disappears. Commercially canned products prepared in a vacuum retain the vitamin better. Naturally acid foods lose less vitamin C content in cooking. There is some loss of the vitamin during storage. Quick freezing of foods retains the vitamins, as do the best methods of drying. Frosted foods should not be thawed before cooking and the juices should be used.

History of Vitamin Research

The deficiency diseases are as old as the human race. Skeletons of prehistoric men bear signs of rickets and scurvy. In ancient manuscripts, physicians described the symptoms of rickets, scurvy, beriberi, and night blindness. Such remedies as livers of goats prescribed for night blindness by the Greeks and Romans, and the oranges, lemons, and limes used to prevent scurvy on long ship voyages as early as the 16th century, indicate that men long ago realized the relationship of diet to certain specific diseases. But the existence in food of special protective ingredients was not suspected.

One of the first clues came in 1882 when Kanehiro Takaki, a Japanese naval doctor, demonstrated that the addition of vegetables and milk to navy rations of polished rice would prevent the onset of the severe nervous disorder beriberi. This disease had for centuries scourged Oriental peoples whose chief food is polished rice. In 1897 Christian Eijkman, a member of a commission sent by the Netherlands government to Java to study the disease, caused chickens to develop an identical disorder by feeding them only polished rice. He experimented on these chickens and found that he could prevent or cure the disorder by including the rice hulls in the feeding. By soaking the rice hulls in a solution of alcohol, he obtained an extract of great curative power. We know now that this extract was the vitamin B complex.

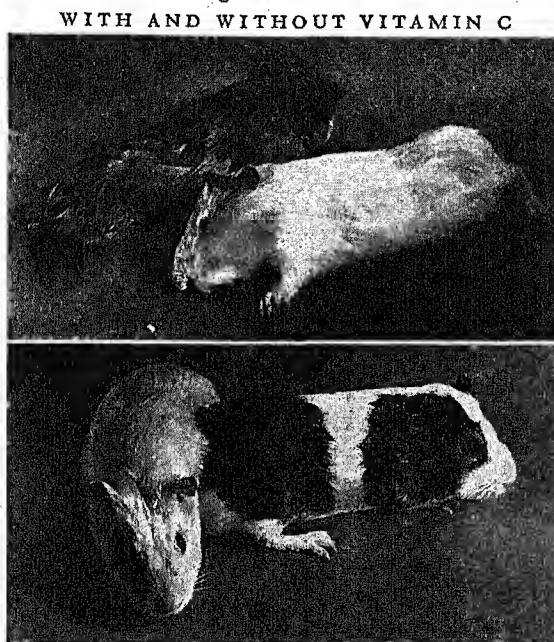
Experiments with Animals

Virtually all investigations of the cause and cure of deficiency diseases have depended upon feeding experimental diets to animals. First, the animals were deprived of one natural food after the other until they showed disease symptoms. Then, one by one, the foods in question were restored. The ones which brought the animals back to health were carefully

noted, and the next step was to find out what *part* of each food was responsible for the cure. Each food was broken down into its various ingredients, and one by one each of these was removed from the diet of the animals until the effective one was discovered. Few types of scientific investigation have required so much time, patience, and care.

In 1907 the Norwegian chemists Axel Holst and Theodor Frølich produced scurvy in guinea pigs by feeding them on a restricted diet. These animals then received various foods until it was discovered that certain fruits and vegetables cured them, including the citrus fruits, cabbage, and peppers. Next, investigators sought to extract the pure antiscorbutic substance from these foods. But it was not until 1932 that Albert Szent-Györgyi, a Hungarian physician, working with peppers succeeded in isolating pure vitamin C.

In the early 1900's other scientists were investigating various foods to test the truth of the belief then held that carbohydrates, fats, proteins, and minerals were the only necessary food constituents. Between 1906 and 1912, Sir F. Gowland Hopkins of Cambridge University found that young rats stopped growing and presently died when they were fed on chemically pure carbohydrates, fats, proteins, and minerals. But rats fed on the same diet with fresh milk added gained in weight and flourished. This showed that milk contained what



The guinea pigs at the top show the results of a diet entirely lacking in vitamin C. Their symptoms are typical of scurvy. The two at the bottom had the same diet with vitamin C added. A few doses of the vitamin will restore the sick guinea pigs.

Hopkins called "accessory food factors." Between 1913 and 1915 the American biochemists Elmer V. McCollum and Marguerite Davis concluded after prolonged experiments that at least two accessory factors were required for a healthful diet. They named them respectively "fat-soluble A" and "water-soluble B." The former was shown to be present in some fats, such as cod liver oil, egg-yolk fat, and butter, but lacking in other common fats, such as lard or olive oil. This was the first step toward the recognition of vitamin A, for "fat-soluble A" was in reality a combination of vitamins A and D. Water-soluble B, on the other hand, was a mixture of the B complex and of vitamin C.

Origin of the Word "Vitamin"

As the studies progressed, scientists sought a term for these new food factors. In 1911-12 the Polish chemist Casimir Funk had proposed that the accessory food factors, whatever their nature, be called *vita-*

mines. The word came from the Latin word *vita*, meaning "life," and *amine*, the name of the chemical family to which he thought the substances belonged. In 1920 Jack Cecil Drummond, biochemist at the University of London, suggested that the final "e" be dropped from the word and that the factors thus far discovered be called vitamins A, B, and C.

Vitamin D Presents a Special Problem

The research that led to the identification of vitamin D was delayed by peculiar circumstances. Rickets had been cured in two different ways—by direct sunlight on the skin and by a food factor contained in fish liver oils. What could the two have in common? The case was further complicated by the fact that fish liver oils are rich in vitamin A, and for a time this vitamin was given credit for preventing rickets. Not until 1922 did McCollum and his co-workers establish the distinction between the two factors contained in the oils.

Two years later the relationship between sunlight and the food factor was made clear. Two groups of research workers—one headed by Alfred Hess and one by Harry Steenbock—independently demonstrated that certain foods exposed to ultra-violet light acquired the power to prevent rickets. The part of the food affected by the rays was found to be a sterol, and the vitamin produced in it was named vitamin D.

Separating the B Complex

The early preparations of vitamin B from rice polishings and from yeast not only prevented beriberi and similar neuritic disorders but also promoted growth. Experiments in 1926 showed that when a B preparation was raised to a high temperature, it lost its anti-neuritic power but retained its growth-promoting property. It was evident that what was then called plain vitamin B was a complex containing at least two factors. The first— B_1 or thiamin—was isolated that same year. The second, or growth-promoting factor, was found to be further subdivided.

Since 1914 Dr. Joseph Goldberger had been trying to find the cause and cure of pellagra, a disease that afflicts people who live chiefly on corn meal, dried beans, and salt pork. It produces sores on the skin and in the mouth, and brings on mental disorders. By 1926 Dr. Goldberger's diet research had shown that the vitamin B complex contained a pellagra-preventive or P-P factor.

In 1933 vitamin B_2 or riboflavin was isolated from what remained of the B complex, and in 1936 the P-P factor was identified as nicotinic acid, a substance already known but not previously recognized as an essential food factor. Pyridoxin or B_6 had been distinguished from B_2 in 1934, and was isolated in 1938. Pantothenic acid was distinguished from all the other B factors in 1936.

Other Vitamin Discoveries

The failure of rats to reproduce on certain purified diets was observed in 1922, but the missing ingredient, vitamin E, was not identified and isolated until 1936. The existence of a vitamin that helps blood to coagu-

late and thus checks hemorrhages was recognized in 1934 and the new factor was called vitamin K. It was isolated in 1939. Another that controls leakage of blood from the capillaries was reported in 1936 and named vitamin P or citrin.

For many years investigators suspected that there was a substance in animal tissues protecting them from some of the poisons normally generated in the body system. Large doses of egg white seemed to neutralize or destroy this substance, and in its absence the patients suffered from discoloration of the skin, loss of weight, weakness, and muscular pains. By 1940 the protective substance was shown to be a vitamin and was named *biotin* or vitamin H. It is abundant in vegetable foods, and a lack of it will almost never occur naturally.

Chemistry and Physiology of Vitamins

Vitamins are complex substances, widely differing from one another in their chemical composition and structure. Their degree of complexity may be indicated by their empirical formulas, ranging from vitamin C ($C_6H_8O_6$) and nicotinic acid ($C_6H_5O_2N$) to thiamin ($C_{12}H_{17}ON_4SCl$).

Some of them must undergo marked changes in the body before they can do their effective work. Thus when we speak of getting vitamin A from vegetable foods, what we mean is that we get a plant material called *carotene*, which is transformed inside our bodies into the true vitamin A. These preliminary substances are often called *provitamins*.

Artificial production of vitamins began with the synthesis of vitamin C in 1933. Others were synthesized as follows: riboflavin or B_2 in 1935, thiamin or B_1 in 1936, vitamin E in 1938, pyridoxin and vitamin K in 1939, and pantothenic acid in 1940.

Vitamins do their work of regulation and protection in very much the same way as do the hormones produced by the glands of the body (see Gland). Those that are water-soluble are absorbed directly into the blood stream from the intestinal tract. The fat-soluble vitamins must first be mixed with bile. Very large doses of vitamin preparations appear to have no toxic effects; thus there is no danger of getting "too much" of any vitamin.

How Vitamins Are Measured

The quantity of vitamin in a food or in a medical preparation is commonly expressed in one of two ways. For the vitamins that have been synthesized, weights are given in milligrams (one milligram equals .0154 grains) or in micrograms (1,000 micrograms equal one milligram). The symbol gamma (γ) means the same as microgram. For vitamins that have not been synthesized and cannot therefore be measured with exactness, the quantity or potency is indicated in international *biological units*, also called U. S. Pharmacopeia (M.S.P.) units. These are based on the curative effect of a measured quantity of the vitamin-containing substance on test animals.

VLADIVOSTOK (*vlád-í-vòs-tòk*). As the chief seaport of Asiatic Russia and the outlet for the great Amur Valley, Vladivostok is one of the Soviet Union's most important centers for foreign trade. It is Russia's Pacific naval, submarine, and air base. Daily air service is maintained with Moscow, some 6,000 miles to the west. The Trans-Siberian Railway, from Leningrad to Vladivostok, is the longest transcontinental railway line in the world. It also has regular connection with Russia proper by two water routes: the northern, through Arctic water and ship canals to the Baltic Sea, and the southern, through the Suez Canal and the Dardanelles to the Black Sea. Its com-

mercial growth began in 1905 when Dalny (now Dairen) fell to Japan. During the first World War it received fresh impetus as the Allies' "back door to Russia." With the development of Siberia after this war, and exploitation of its great lumber and iron resources, trade increased still more. Soy beans, soybean oil, lumber, and fish are the chief exports; manufactured goods are imported. The strongly fortified

harbor, known as the Golden Horn, is four miles long and a mile wide. Dry docks, shipyards, and every modern shipping facility line its shores. Icebreakers and air bombs keep it open in the bitterly cold winter months.

The city is the seat of the University of the Far East, and it has several technical, industrial, and professional schools. It was founded in 1858. The name means "Ruler of the East." Population, 205,000.

PLANNED TRAINING *Is Making* BETTER WORKERS

How Coöperation Between Schools and Employers Is Improving Each Worker's Chance for Success and Happiness—Modern Systems of Training

VOCATIONAL EDUCATION. Early in the story of civilization, we find that the tribe gave systematic training in the occupations which were needed for the welfare of everyone. When a man became especially skilful in fishing, hunting, or in making arrows and spears, for example, he was given the responsibility of instructing the youth of the tribe in those activities. In this way, the young people learned correct methods without loss of time. The importance of this truth has never been forgotten, and so through the years, repeated efforts have been made to give some kind of planned training in place of the more or less inefficient and wasteful ways in which many people learn their work in life; that is, their vocation, or calling (from the Latin word *vocare*, which means "to call"). Systematic training, then, in the work by which a person can make a living is known as "vocational education."

With the development of town life, the primitive crafts, previously fostered mainly in the homes, were transferred to small industrial establishments, and there arose groups of persons skilled in one kind of work—the blacksmiths, the shoemakers, the hatters, the butchers, the bakers, and the candlestick makers. Naturally, many young people wished to leave the farms and go to the villages to learn one

of these trades, and as a result, the institution of apprenticeship developed. If a boy wished to become a blacksmith, his father would sign a contract with a member of that craft whereby the boy would become an apprentice for a period of seven years. The boy lived in the home of the blacksmith, who taught him, not only the craft, but also reading, writing, arithmetic, manners, and religious principles. At the end of the period of apprenticeship, during which he had served the master blacksmith as a properly trained workman, he was admitted into the ranks of the journeymen—those who had learned a trade. When trade and commerce expanded, office workers such as clerks and bookkeepers were trained in the same way.

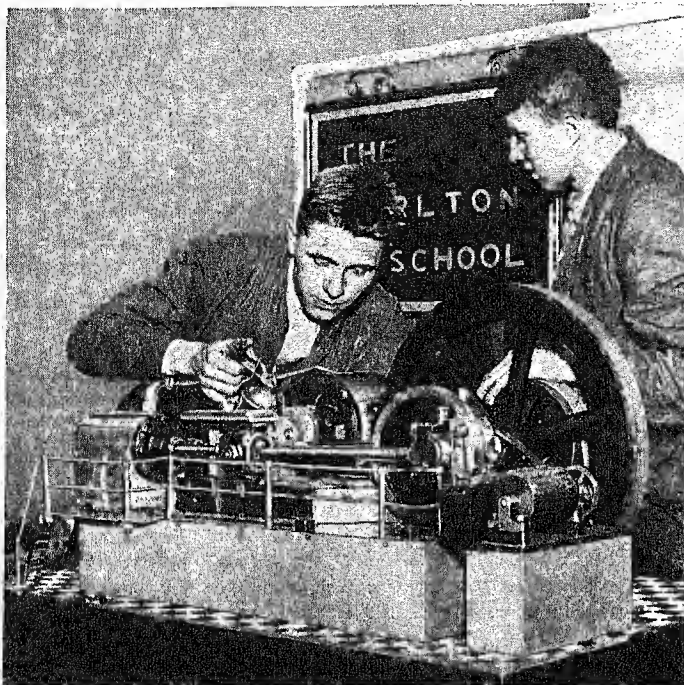
A PRACTICAL VOCATION FOR GIRLS



There are classes in millinery at the Lucy L. Flower High School, a technical school for girls in Chicago. The girls are taught to take the materials and make finished hats that are in style. These girls are working on blocked hats in various stages of completion.

For about five centuries this scheme of apprenticeship training was the only form of systematic and organized vocational training in the world and the only way by which the various callings recruited expert workers. At the best it probably did not serve more than a very small percentage of the total number of boys and girls who were employed in shops, factories, offices, homes, and on farms. Those who were not fortunate enough to receive the benefit of this kind of vocational education, learned their work in life by the "pick-up" method of watching others with some help from superiors.

ENGLISH BOYS RECEIVE VOCATIONAL TRAINING



Boys of the Carlton School, Bedford, England, made this model power plant in their own workshop, for an exhibition in London. Many of the parts had to be cast from melted scrap, while the sheet aluminum used came from old hot water bottles. It was a triumph of ingenuity and careful detailed work.

With the invention of the modern steam engine near the beginning of the 19th century, power-driven machines very rapidly took the place of the old hand tools with which men in the past had fashioned articles out of raw material. Furthermore, about that time science and invention began to revolutionize the work of the world by constant change and improvement in tools, machines, materials, and processes.

These sweeping changes very rapidly broke down many of the old trades and crafts into a series of special occupations, each performed by a different worker. This is one of the reasons why the old system of apprenticeship by a written contract between the employer, the parent, and the youth gradually waned until today there is virtually none of it in the United States, although it is still found in a few European countries.

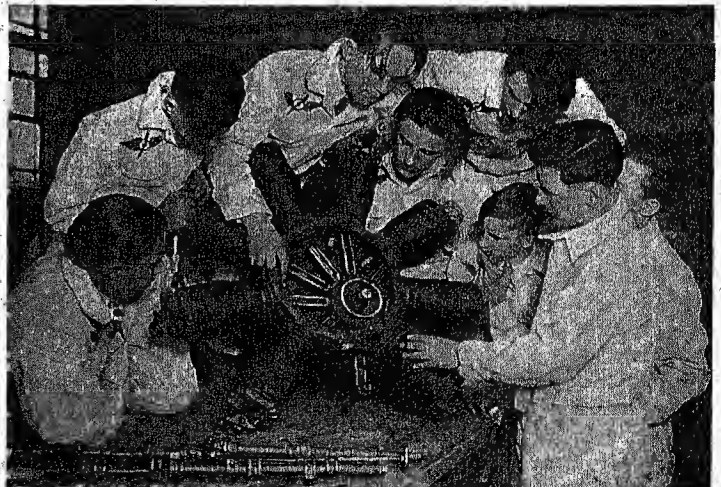
During the last century, the trade unions (organizations of workmen in different trades and other kinds of employment) maintained through agreements with employers a modified form of the old apprenticeship system. Under it the youth served four years as a learner. He was paid a small wage and lived at his father's home. In time most of this kind of vocational training also disappeared. Some unions maintain apprentice schools.

Then it was seen that young people needed help to find the best work for their abilities and interests (see Vocational Guidance), and also systematic training in the many vocations that arose with the advance of science, industry, and commerce. In the United States, this condition led to greater emphasis on training for the professions and to the establishment of vocational courses in universities, colleges, and especially in the public school system, and also to the founding of many special trade, industrial, and business schools.

Universities, colleges, and a number of special schools now offer training for the various professions, and have the power to confer degrees for vocations, such as law, medicine, pharmacy, nursing, dentistry, engineering, business administration, divinity, and education. Usually certain courses in a college of liberal arts as well as the professional courses are required; thus, the degree for law and medicine, for example, can ordinarily be earned only after six or seven years of study beyond that of high school. Among other vocations for which training is offered are music, art, forestry, agriculture, physical education, home economics, library work, journalism, architecture, and mining and metallurgy.

Teachers in elementary, secondary, and high schools may receive special training in state normal colleges, or normal schools, for which the completion of high-school work is often a prerequisite. Much emphasis is being placed on courses for kindergarten teachers since the importance of the best possible training in the early years of life has been better understood (see

A TRAINING THAT FASCINATES MANY BOYS



In many schools, practical instruction in aviation mechanics is made available to the many boys who wish to become qualified for work in this vocation. In the above picture the class is receiving instruction on motors.

Kindergarten). These schools also sometimes offer courses in the teaching of the blind and the deaf.

The expansion of commerce and industry with its emphasis on specialization led to a demand for trained workers in many vocations. This has largely been met by vocational education in secondary schools, as well as by the training offered in many kinds of business and industry and in privately conducted industrial, business, and trade schools. Instruction in commercial subjects, such as bookkeeping and stenography, is now generally offered in high schools.

The Smith-Hughes Act

To encourage vocational education in the states, Congress in 1917 passed the Smith-Hughes Vocational Education Act. Under this act and subsequent acts, Congress appropriates money to the states and territories for agricultural, home-economics, industrial, and trade classes or schools and for the training of teachers in these fields. The Smith-Hughes Act specifies that such education shall be of less than college grade and shall be for persons over 14 years of age. A Federal Board for Vocational Education was established to administer the act, but in 1933 its functions were transferred to the Office of Education; the board now acts in an advisory capacity only. The various state boards cooperate with the federal administrative staff.

Vocational instruction is given in three kinds of schools and classes: (1) all-day or full-time schools give preparation to young people for entrance upon work in agriculture, home economics, and trades and industries; (2) part-time or extension classes give further training in skill or knowledge to those who are already employed in these lines; and (3) evening extension classes give extension training to adults in the same lines of employment which they follow during the day. (See Education; School.)

Agricultural education, which includes supervised practice on farms, has made remarkable progress. Local and state organizations started by secondary-school students have formed a national organization, the Future Farmers of America, which is an integral part of the vocational agriculture program.

Great impetus was given to vocational education by the economic depression of the early 1930's. Young

people unable to find work were kept occupied in part-time or full-time classes. Unemployed men and women were enabled to maintain and improve their old skills or were trained in new trades. In 1936 the George-Deen Act included provision for classes for workers in the "distributive" occupations—those who handle a product in any way after it leaves production—and for those engaged in public service.

Training for the Defense Industries

Vocational education was greatly aided by the work of the Office of Education, the National Youth Administration, and the Civilian Conservation Corps. After war broke out in Europe in 1939, the national defense program in the United States emphasized and enlarged the rôles which these and other agencies played. Many skilled workers were needed in the defense industries, and the government voted huge appropriations for an extensive training program. The NYA gave practical training in the metal and mechanical trades, radio and electrical work, automotive and airplane machinery, and construction work. The CCC trained for noncombative services such as motor mechanics and cooks. Apprentice training in public trade schools and in private industry was enlarged for aviation, shipbuilding, and the metal trades. "Refresher" courses were given to workmen whose skill had become ineffective through disuse. Many of the courses were "diluted" or "streamlined," employing the assembly-line principles of subdivision of labor; each student was taught quickly a small part of the trade, to learn the rest at a later date.

Large sums were granted by the government to technical colleges, to train students in aviation under the Civil Aeronautics Authority, and to train technicians in various branches of the engineering industries. The government paid the tuition of such students. Special emphasis was put on ensuring a supply of trained men for the all-important machine-tool and aircraft industries.

Emphasis on vocational training is part of educational systems in some European countries. In Europe the apprentice system is more strongly entrenched than in the United States. Learning on the job, however, is necessary to successful vocational education; and for that reason the development of cooperation between industries and schools is an important phase of the American vocational program.

WHAT SHALL I Do for a LIVING?

A Fundamental Question in the Life of Every Boy and Girl—How Vocational Guidance Helps to Find the Answer—Its Great Scope—The Study of Vocations to Make a Wise Selection

VOCATIONAL GUIDANCE. One of the most perplexing questions confronting young people is that of the choice of a life career. Your choice of an occupation will affect your decision in a number of important situations which you must face as a student. The secondary school should, and usually does, provide at least the beginnings of vocational education. What you intend to do after school days are over will in a

large measure determine the length of time you will remain in school, as well as the subjects and the course of study you will choose. Your high school offers you a wide range of subjects, only a portion of which can be taken by any one student. Each of these courses of study points in a different direction. In one, you are preparing for entrance into the skilled trades. In another, you are given intensive

training in the commercial subjects in preparation for a business career. Students enrolled in courses of a third type are being trained to enter the agricultural pursuits. Still another group have elected a course of study which prepares them for the college or university, where they will be given the highly specialized training required of those who enter the professions. Your school work becomes more meaningful and interesting when it is tied up with your future program. (See Education; School; Universities and Colleges.)

In terms of your future happiness and usefulness, your choice of a life career is probably one of the most important decisions you will ever make. Work for which one is adapted and in which one is genuinely interested is like play, and becomes a source of joy and satisfaction. When it is realized that one spends six or eight hours a day, five or six days a week, month after month, and year after year in the work of his choosing, it becomes apparent that the choice of this occupation is a very important decision.

Many People Improperly Placed

Large numbers of people today find themselves in occupations for which they are not adapted and in which they have little or no interest. In contrast with those who made wise selections, they are likely to be dissatisfied and inefficient workers, to whom the daily tasks are frequently near drudgery. It is probable that many of these unhappy misfits simply drifted into their present lines of work by taking the first job that came their way without considering either the requirements of the work or their qualifications for it. Others may have chosen unwisely by attaching too much importance to some particularly attractive feature, such as a high wage schedule, or the promise of desirable social recognition, without giving adequate consideration to whether or not the nature of their interests and abilities promised a large measure of success and satisfaction. There is reason to believe that much of

this disturbing maladjustment could have been prevented if the workers had given proper recognition to all of the factors which must be taken into account in the making of a sound vocational choice.

The Possibilities of Success

Some people believe that a person is "born for" or "cut out for" some one occupation and that he cannot be successful unless he finds it. This is not true. The possibilities of success and happiness for an

individual are not limited to any one occupation. The requirements of certain occupations are very much alike. To illustrate, the successful stationary engineer might have done equally well as a locomotive engineer. The work of the dentist requires about the same qualities that are required of the medical man. An executive in charge of one type of business would probably have been equally successful in many of the other lines of commerce. The highly successful automobile salesman might be selling real estate, insurance, or bonds with equal proficiency if he had chosen one of these other types of work.

We are not to think from the above, however, that an individual is equally qualified for all occupations. Instead, it is to be understood that there are types of work, rather than specified occupations, in which one can reasonably expect to succeed. The important

thing is to be able to direct yourself toward vocations of the type in which you can expect to find success and happiness. Keep in mind the fact that it is not necessary to make a conspicuous success in any field in order to be happy and prosperous in the best sense of these words. Every general type of work contains within it many separate vocations in which people of different aptitudes may best find themselves. Nor need accidents of fortune always mean the abandonment of your choice. An inability to finish medical school, for example, might make a first-class laboratory man out of what might have been a second-rate physician. Many corporations maintain personnel

COLOR AND DRAMA IN STEEL MAKING



To some people, the calling of the steel worker at this great open-hearth furnace may seem hot and dangerous. To others, it may seem full of glamor and excitement. The photographer who made this striking picture sensed something of the spirit that makes some men choose this occupation and find in it a full measure of success and happiness.

departments today, with experts at the head, who realize that every worker represents an investment of time and money on the part of the employer. They make every effort to fit capable workers into the particular phase of the company's activity in which the greatest success seems possible.

In their attempts to choose the right vocations many people make the mistake of deciding to enter certain vocations because of some one factor that was really of little or no real significance. One boy decided to become a lawyer simply because he admired a vigorous young attorney for whom he caddied. A

doctor reared his only son with the idea that the boy was to attend medical school and return to go into partnership with him. It is obvious that the choice of a life career should be made upon a more adequate basis than sentiment, and like considerations. Another frequent mistake is an over-emphasis upon the social standing which seems to be associated with certain types of work.

It is legitimate and desirable for one to seek social recognition, but it is certainly unwise to allow oneself to enter even a "highly respected" occupation for which one is not particularly fitted. Actually, as the educational level of workers engaged in the vocations continues to rise, the members of these occupational groups come to be held in increasingly higher social regard in their communities.

Factors To Be Considered

Let us now turn our attention to a consideration of the things which have proved helpful. How can you guide yourself toward the occupations in which you can be reasonably certain of success and happiness? There are two things which you need to do. First, examine yourself in the light of your past and present experience to discover your interests and your points of particular strength or weakness. Second, study the occupations of the world to discover what conditions have to be met in different types of work, and what qualifications are required of the workers. In other words, the choice of an occupation should be made only after you have discovered your interests and your abilities, and have related these items of information about yourself to all the facts that you can gather about the occupations. This is not a difficult task, for there are many ways in which this necessary information may be obtained with little trouble.

Your interests are revealed by the nature of your likes and dislikes. Clues to these are to be found in your daily life. Which of your school subjects have you enjoyed most? Which have you disliked? If you found your shop course interesting and looked forward to it, you would probably be making a wise selection in choosing an occupation where there would be much work with tools. If mathematics proved distasteful, however, it might be unwise for you to look forward to some branch of engineering as a career. The boy or girl who enjoys directing the activities of a club or class will probably find the

various types of executive and administrative work to his or her liking. Careers in commercial art, illustrating, cartooning, drafting, and the like, will be likely to prove attractive to the boy or girl who has satisfied his or her desire to draw by doing sketches, cartoons, posters, placards, and so on for the school annual, the school paper, or some other organization. These examples show that

HOME MAKING IS CONSIDERED A CAREER



In this Berlin school girls receive a thorough training in all branches of home economics and domestic science. Even commercial schools, which offer business training, have such courses for the students.

many, if not most, of our likes and dislikes have occupational significance. They should be recognized and carefully considered in our thinking as we attempt the choice of a life career.

Methods of Discovering Abilities

One usually likes to do the things that one can do well, and, conversely, usually does well the things in which there is a keen interest. In your experience both in and out of school, you have probably found that there are some things you can do well. In other activities or enterprises, you have probably achieved a moderate or average degree of success. All these are signposts which point the way to a wise selection of a career.

Most important of all, for a start, is an understanding of oneself, made in a fair and unbiased way. Make a chart of yourself, based on some such list of traits as the one on the next page.

The result of this study is an understanding of but the first of the three fundamentals of character (see Character and Personality), ability, and knowledge upon which your future success will rest. As to your ability, list the studies you have taken, or better still, list all the studies you have considered taking, and note the reasons for not taking some, the reasons for taking others, and your grades. This will give you a clue to your abilities, and will indicate weak spots,

possibly, in the third great fundamental—knowledge. Add to that a list of the things you have done outside the classroom. Each activity points to capabilities that you possess—capabilities that may make the choice of a vocation a much simpler matter. In this way your interests and abilities may be revealed.

Information on Vocations

In many schools there are vocational guidance experts, who note these tendencies and are trained to advise regarding possible careers, always keeping in mind the particular traits of the individual. (See articles on Individual Differences; Intelligence Tests.)

After knowing one's interests and abilities, the selection of the type of activity should be based upon information regarding the world's work. It is estimated that there are 20,000 ways of earning a living in the United States alone, and over 600 distinct vocations. Furthermore, new occupations develop as others disappear, since every year sees new inventions and new processes, such as those in aviation and the radio industry. Many of these call for experts in a limited field, for specialization is today a marked feature of every profession, and indeed of nearly every other type of work. As a result, much emphasis is placed on vocational education, which is given in universities, colleges, high schools, and many special types of schools. (See Vocational Education.) This specialization is not a drawback to success, nor does it necessarily mean a limiting of the field. Rather, in many cases, it gives the individual greater opportunity to develop special talents and capabilities to an extent that might otherwise be denied him.

The Office of Education in the Federal Security Agency and the Government Printing Office, both in Washington, D. C., will send on request lists of government publications on vocations which may be obtained free or at a nominal charge. The monthly *Occupational Index*, prepared by the National Occupational Conference, New York City, indexes current books, magazine articles, and pamphlets on vocations.

To such information you should add a certain amount of first-hand knowledge of the vocations under consideration. There are important factors that have a decided bearing on your selection, which might be overlooked unless you know definitely what to consider. This applies equally to the choice of vocation by girls and boys, for today, women have entered all except about 30 of the separate vocations.

Questions for Vocational Study

A series of essential questions will be found helpful as you observe workers and ask about their tasks.

1. What does the worker in this vocation do?

2. Is there opportunity for regular and sufficient employment with reasonable working hours throughout the year?

3. What contribution does the vocation make to the general welfare of society?

4. How many people are employed? Is this number increasing or has it shown a general decrease?

5. How extensive are the opportunities for employment in this vocation as compared with others locally and generally?

6. What is the effect of the vocation on the physical, mental, and moral well-being of the worker?

7. What financial return do the workers receive? Is it increasing or decreasing?

8. What is the beginning job, and what are the successive positions through which advance in the vocation is made?

9. What preparation is required?

10. In the light of my interests and the things I have enjoyed doing, is it probable that I would enjoy this work?

11. Do my successes, or my failures, and perhaps my ratings by tests, suggest that I would be able to prepare for the vocation and succeed in it?

In using this outline, think always of yourself as performing the actual tasks of each vocation you consider. Try to relate each of the tasks to your past experience in order to discover whether or not your interests and abilities give promise of success in the work. Try to discover whether the demand for workers is increasing or decreasing. If there are

A METHOD OF SELF-ANALYSIS

	Outstanding	High	Average	Below Average	Poor
1. Honesty, Sincerity, Truthfulness					
2. Coöperation					
3. Kindness, Affection					
4. Will-Power, Poise, Self-Control					
5. Muscular Control, Skill					
6. Executive Ability					
7. Inventiveness, Constructiveness					
8. Discernment, Thinking					
a. Memory					
b. Senses					
c. Observation (Gathering Data)					
d. Classification (Organizing Data)					
e. Reasoning (Understanding Data)					
f. Verification					
g. Broadmindedness					
9. Purpose, Determination					
10. Justice					
11. Interest and Attention					
12. Vitality					
13. Industry, Energy					
14. Urges, Ambitions					
15. Public Spirit, Family Loyalty					

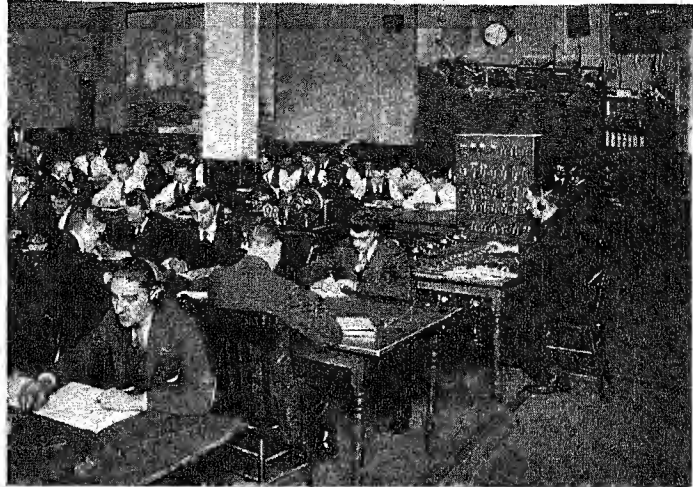
If you use a method of self-analysis like the above, it is quite necessary that you be completely honest and fair with yourself. Undervaluation of your character fundamentals is to be as carefully avoided as overvaluation. In some cases you may wish to consult friends on whose impartial judgment you can rely. Or the analysis may be done by a group, in which case analyses are passed from one to another until a group average is obtained for each individual. On page 325 of this article is shown a practical application of this analysis to a career.

ONE OF THE NEWEST VOCATIONS

frequent "lay-offs" and if the wage level is unreasonably low, you can be fairly certain that the demand is not increasing or that too large a number of workers have found their way into this vocation. On the other hand, a high wage level with regular employment may be taken as an indication that there is a strong demand for the work and that the occupation is not overcrowded. You should also determine whether or not the occupation has hazards to health, such as dust-laden air or gas fumes, and whether it keeps you eager to gain new information.

Preparation for Higher Positions

This brings us to the third leg upon which success rests—knowledge. There are, in all general types of work, various levels ranging from those of a relatively humble nature up through a series of increasingly important positions to the highest one which the vocation affords. Promotion depends, in most cases, upon the ability of the individual, and that in turn often rests upon acquired knowledge. In practically all the more desirable occupations, one must enter near, if not at, the bottom of the ladder and earn his right to be considered for the responsibilities of the higher positions. The prospective worker should be interested in discovering through what definite steps promotion progresses, how long one usually stays on each of the lower levels, and what salaries are received. The following questions indicate some of the information that should be sought for a complete study.



The radio has been responsible for many new callings. Here is just a part of a large class of young men who are learning to send and receive code messages under the guidance of an instructor, who can be seen at the table on the right. He can "listen in" on the messages which the members of the class are sending, or send messages to them.

1. Is advancement by merit, by seniority, or by length of service only?
2. In the case of particular companies or firms, is it their practise to fill higher positions from the ranks of their own workers or from outside?
3. Are competitive conditions such that workers make a practise of shifting from one company to another either locally or generally?
4. Are there "dead spots" in the line of promotion, where employees become pocketed with no chance for further advancement?

5. Does promotion depend to any extent upon schooling or the acquirement of knowledge outside the routine of business?

This last question brings definitely to the front the question of education and its relation to the success of the individual. Careful consideration should be given to the kind and extent of preparation required of the worker in that vocation. What type of training is required? How much will it cost? How long does it take? May it be taken at home?

Are there several different types of training available? Is there a standard of comparison? Is the type of training under consideration on a par with the standards of the vocation, or is it of a make-shift type?

Lack of funds should not always be considered a bar to the acquirement of special training. You may work your way through col-

SWISS BOYS ARE TAUGHT PHOTOGRAPHY

In some of the schools of Switzerland instruction is given in photography. These ten boys are receiving some practical instruction in the art of handling a camera. Later they will learn the best methods of developing and printing from negatives.

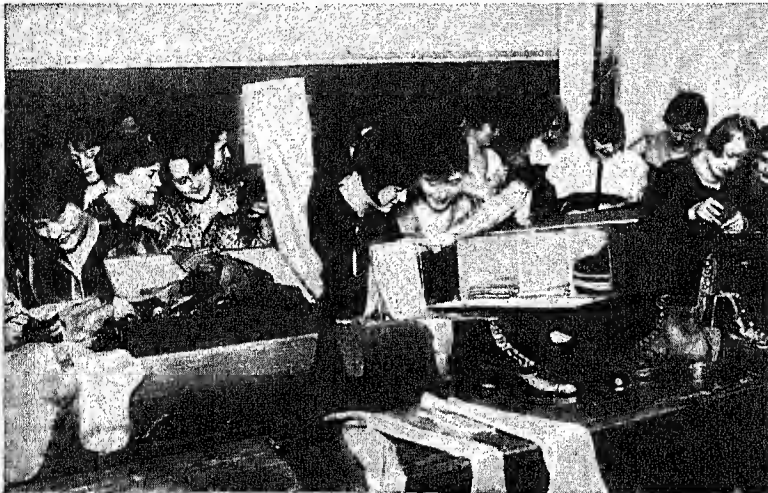
lege and professional school as thousands have done. Many colleges and universities have employment bureaus to help students to support themselves. But consideration should be given to "gaps" which sometimes exist between the completion of training and the earning of sufficient means of support, as in the case of physicians, the period after internship when a practise is being established.

If, after seriously studying both yourself and a given occupation, you are convinced that there is a strong probability that you will be able to prepare for the work and succeed in it, you have doubtless found one of the number of occupations in which you could reasonably expect to be both happy and successful. However, it would hardly be intelligent to

drama, painting, sculpture, the dance, decorating, and others. There are many vocations which relate to animals, plants, and the soil, such as animal husbandry, horticulture, agriculture, forestry, fishing, and the like. There is a group which might best be described as consisting of public service, which includes the police, firemen, and many other public officials and employees. There is a great group engaged in transportation, which ordinarily includes the railroads and street railways, telegraph and telephone companies, road and sewer builders and those occupied in their maintenance, the postal service, garages, bus companies, and the like. Another classification consists of those engaged in the extraction of minerals, such as coal, oil, and gas,

and other metals and stones. The great division of trade includes those vocations which deal with banking and brokerage, insurance and real estate, and various wholesale and retail businesses. A large classification is that concerned with domestic and personal service, which includes hotels, boarding houses, and restaurants, laundries, cleaning, dyeing and pressing shops, barbers, hairdressers, manicurists, and all the forms of personal and domestic service such as chauffeurs, cooks, and others. The last division is the largest in point of numbers and includes all those engaged in manufacturing and mechanical industries, whether in production, sale, accounting, or any of the diverse processes involved in modern business.

SHOES AND STOCKINGS INSTEAD OF BOOKS



These girls are clerks in shops and department stores of Berlin, Germany, and in this school some of the classroom work is devoted to a study of the products which they sell. In the United States many large department stores maintain their own schools, so that the sales force may receive special training. Smaller shops have to rely on personal training of the individual by proprietors or through sales literature.

choose definitely the first such favorable vocation you may find. Rather, you should attempt to discover as large a number of these vocations as you can, and then, after careful comparison, select the most promising and attractive one. When the final selection is made of some general type of vocation, a decision as to what branch of it to enter may be made, or may be left open until first-hand knowledge and the result of actual experience points the way. Sometimes the preliminary training required brings out in the prospective worker hidden capabilities that make for larger success.

Studying the Vocations

The 600 and more vocations may be roughly divided, for purposes of comparison and study, into several large groups. There are the professions, which ordinarily include medicine, the law, the ministry, teaching, architecture, and various branches of engineering. To them might be added certain other vocations which are frequently considered as professions, such as those connected with the various arts, music,

groups of vocations is desirable on the part of the prospective worker. Each of them requires certain qualifications or possesses certain advantages or disadvantages which may, at the very start, aid the student in making his selection. For example, the professions, almost without exception, require from four to seven years of college training after high school. One outstanding characteristic of the group connected with animals, plants, and the soil, is the out-of-doors nature of the work, which in many cases might be a deciding factor because of personal considerations.

It will not be possible in the space of this article to do more than outline the chief facts about the various groups of vocations, and to give some of the essentials on some of the individual callings. However, many of them are treated in separate articles, to which reference will be made, and in the bibliography at the end of the Reference-Outline will be found the titles of many books which deal with the subjects completely.

A vocation is usually said to be a profession when graduation from college or university is required. As the nature of the work in many occupations becomes increasingly technical, and therefore requires better training, new professions arise, especially in engineering and applied sciences.

General Conditions in the Professions

At present the need for all types of professional service provides profitable work for approximately 7 to 10 per cent of those gainfully employed in the United States. Very few lines of endeavor offer more of interest, variety, and opportunity than do the professions to the properly trained and capable worker. Although some of the professions may be somewhat overcrowded, the person of superior ability and determination can hope for a measure of success in any of them. They constitute a challenge to all boys and girls to make the best possible use of their abilities.

Various Kinds of Engineering

Engineering has properly been called the profession of progress. It is the engineer who has brought about great economies in time and materials, and has perfected innumerable mechanical devices which give us control over great sources of power. We are indebted to him for the development of the skyscraper, the radio, the airplane, the submarine, the suspension bridge, the steamboat, the typewriter, the iceless refrigerator, the sewing machine, the electric stove, the vacuum cleaner, and for nearly all of the other conveniences and appliances which make modern life possible. The variety in the profession may be seen by the many different types of engineering: aeronautical, automotive, chemical, civil, electrical, heating and ventilating, highway, hydraulic, marine, mechanical, metallurgical, mining, sanitary, structural, and textile, as well as many others which specialization renders necessary.

Civil engineering embraces transportation engineering, the building of railways, highways, docks, canals, tunnels, the development of water power and irrigation—in fact, with all problems concerning methods and means of supporting loads, whether variable, moving, or stationary. It is not strictly an out-of-doors profession, for within the ranks of the civil engineers will be found executives, designers, estimators, draftsmen, and office workers, as well as

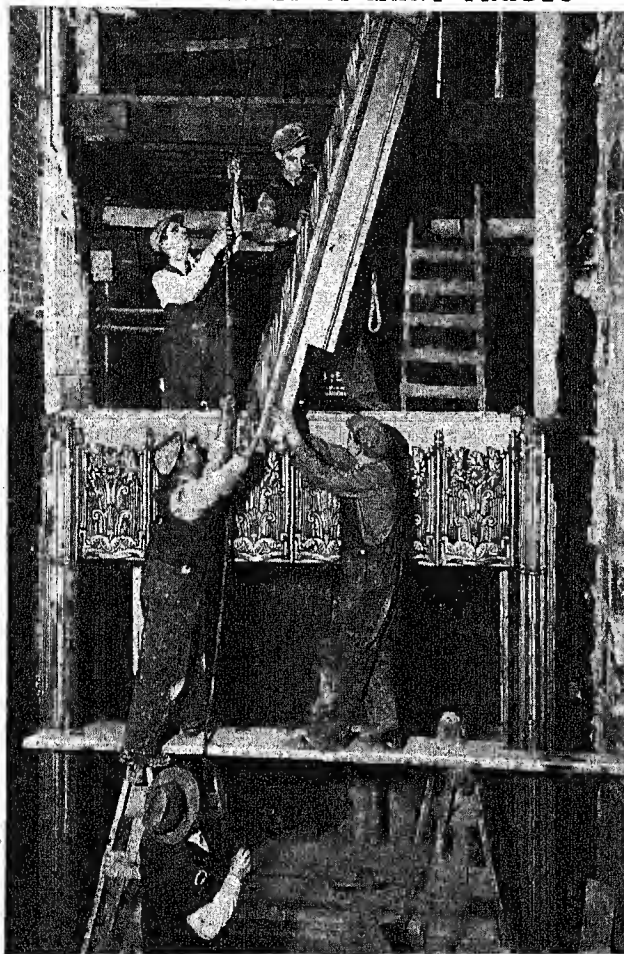
field men, surveyors, superintendents of construction, and the like. The demands on the engineer are great, long working hours being frequent, with periods of inactivity between jobs. A four-year college course is usually required, though the tendency in some of the specialized branches is to extend this period. The profession covers such a wide field that the courses at college are necessarily highly specialized, and little time is available for anything but the requisites. For that reason many recommend a broad, general course in high school.

The mechanical engineer is chiefly concerned with the invention, design, and construction of machinery and its application to industry. The profession requires an analytical mind, an ability to solve problems, patience, skill in mathematics, ingenuity, resourcefulness, and a love of mechanical

things. A knowledge of French and German for research work is desirable, and special college courses ought to be accompanied by law, history, and political science. Mechanical engineers have opportunities to become managers of industrial plants, superintendents of equipment in many industries, or to build up consulting businesses of their own.

There are various branches of mechanical engineering which are becoming increasingly important. In heating and ventilating, great advances are looked for in the field of air conditioning. The acoustical

BUILDING UTILIZES MANY TRADES



These workmen are putting in place the ornamental metal work for the entrance of a modern office building. When finished this building will represent the work of men in hundreds of different vocations.

engineer, whose work is closely related to that of the electrical engineer, has come into recent prominence, in the radio and motion-picture industry, and as a consultant in the building of theaters, schools, churches, and other public buildings. He quiets machinery, street noises, and finds a place in laboratories engaged in research for insulating materials.

The aeronautical engineer specializes in aviation, dealing almost exclusively with fuselage and engine. The refrigeration engineer has a highly specialized work, connected in many ways with that of the heating and ventilating expert. The chemical engineer plans and supervises the installation and operation of chemical plants and relates research to industry in that field. The mining engineer extracts coal, metals, and minerals from the ground, and the metallurgical engineer is concerned with the extraction of metals from ores and their subsequent refinement and use in alloys.

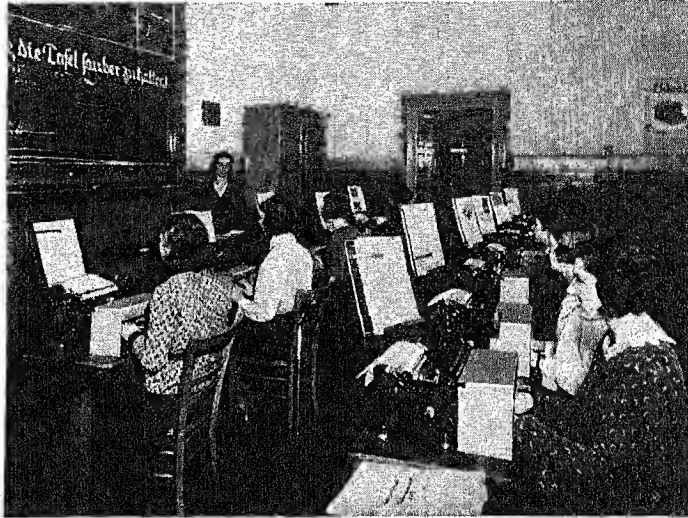
The industrial engineer's work includes factory planning and layout, equipment layout, material handling, time studies of operations and processes, the control of costs, production, and inventory.

The electrical engineer's work may be divided into three classifications: operation, design, and research. For further information on various types of engineering see special articles on Bridge; Building Construction; Chemistry; Electricity; Mines and Mining; Roads and Highways; Surveying.

Opportunities in Teaching

Because of the important part played by schools in the training of citizens in a democracy, the educational institutions of the United States, more so than in any other country, afford many opportunities to those who enter the profession of teaching. In addition to the interesting task of imparting information, the teacher assumes the great responsibility of giving training in character-forming habits. The teaching profession includes specialists in administrative and executive work; college and university presidents, deans, superintendents, principals, librarians, and business managers, as well as those who devote most of their time to classroom instruction; teachers in elementary, secondary, junior high, high, normal, and private and business schools; and teachers in colleges and universities. There are

COMMERCIAL COURSES LEAD TO BUSINESS CAREERS



Students in this Berlin secretarial school are taught shorthand, typing, and the operation of business machines. The shields over their hands keep them from looking at the keys as they learn the "touch" system of typing.

also men and women whose time is spent in research along various lines connected with the fields of learning.

The Honored Medical Profession

Members of the medical and related professions have always rendered a service of great social and economic value. The activities of these important professions vary widely, as many specialists may be found within the classifications of physicians, surgeons, dentists, and

therapists. Training for the practise of medicine usually requires at least seven years of study after high school, followed generally by a period of internship in some hospital or institution. In the case of many specialists, a further period of study and work is frequently considered desirable, usually involving an additional year or so of special work, followed by the building-up of a practise. (See Medicine and Surgery.)

Dentistry is not an overcrowded profession. The training requires from one to two years of general college work followed by a four-year course at dental college, although some institutions have five- and six-year courses. There are seven branches of dentistry, and the tendency is toward specialization. These branches are: orthodontia, or straightening of teeth; oral surgery, treating diseases of the mouth, jaw, and teeth; the making of artificial teeth; extraction; X-ray work; treatment of pyorrhea; and care of children's teeth during the first six years. The work open to dentists includes private practise, school and public clinics, work in industries, and teaching. A dentist must have a certain mechanical ability, a high degree of patience in painstaking detail, and be able to stand long hours. Many begin practise as assistants to established dentists. The profession is one in which some women have made conspicuous successes, and many dental assistants are women. (See Dentistry.)

Nursing ordinarily requires two years' training in a recognized school, and in some states a longer period is needed. A certain amount of medical training is an essential. The prospective worker must have sympathetic understanding and a willingness to perform personal service in connection with the work. Women far outnumber men in this vocation.

Allied with the medical profession is the management of hospitals and institutions (*see Hospitals*). The work is concerned with all activities that do not involve the direct care of the patients and lie outside the medical aspects of such care. Medical men are frequently found in this vocation, as it requires an intimate understanding of the problems of that profession. A high degree of administrative ability is required. The business is usually entered through special employment bureaus. In the same connection might be mentioned the radiologists, trained experts in physical therapy, hydrotherapy, electrotherapy, mechanotherapy, anesthesia, laboratory workers, pharmacists, and others who make up the staff of the modern hospital. Pharmacists are required to pass a state examination after completion of a prescribed course in a recognized school of pharmacy.

Besides nursing, women are finding places in this branch of endeavor as dietitians in hospitals and other institutions, and as social workers, a division which will be treated later. Dietetics deals with the science of nutrition and the feeding of the individual. Specialized college courses, generally of four years' duration, are a requisite for those who wish to advance.

Many Specialists in Law

As all phases of modern life have become more and more complex, there has resulted a vast increase in the number of our laws. Specialists in legal matters perform an almost indispensable service in advising us regarding our rights and duties, and in helping us to settle, in an orderly manner, any dispute over property or personal rights. The common divisions

of the profession are those of the general practitioner, the criminal lawyer, the real estate lawyer, the patent attorney, and the corporation counsel. There are specialists in tax matters, and those whose practise is chiefly commercial, or concerned with the collection of debts. Preparation for law requires six or seven years of study after high school, and the passing of a state examination for admission to the bar. (*See Law.*) Lawyers may have independent practises, or be associated with other attorneys. Such partnerships are common, as it enables firms to take advantage of the particular abilities of the individual members as experts in trial work, briefing, and the like. There are also salaried positions open to attorneys in banks, corporations such as railroads, and other industries. Politics, particularly the legislatures, attract many lawyers, and judges are of course chosen from among their ranks.

Varied Abilities for Architecture

Architecture is one of the world's very old professions, yet it is not overcrowded. Less than 20,000 architects, of whom about 200 are women, each year make plans for new buildings in the United States. The architect must know not only design based on sound artistic and engineering principles, and the method of setting forth his ideas in drawings and models, with exact specifications, but also city and community planning and the development of the fine arts. He must know costs and have the ability to direct the efforts of others. Although competition is keen in this field, many members of the profession win large rewards for successful work. (*See Architecture.*) A college course is a requirement, and a knowledge of engineering, artistic ability,

AMERICAN ENGINES FOR SWEDISH VOCATIONAL INSTRUCTION



This class of boys in the Kungholmen public school at Stockholm, Sweden, is being taught the various parts of an automobile and their functions, with a motor of United States make as a model. Vocational work of this type is popular on the Continent.

historical background, and draftsmanship are essential. Many commence their careers as draftsmen in the employ of other architects.

Landscape Architecture

The landscape architect devotes his attention to landscape improvement, as distinguished from maintenance, which is the province of the gardener. (See *Gardens and Gardening*.) The vocation is especially attractive to women, and many have been more than ordinarily successful in it. The field lies in city and park planning, the laying out of estates, country clubs, cemeteries, gardens, and the like. It is a luxury profession and seasonable, and generally conducted on a fee basis. A general high-school course, including sciences, history, and mechanical drawing, should be followed by college work in botany, soil analysis, and other specialized subjects. The landscape architect must have artistic ability and both theoretical and practical knowledge of the subjects allied with the work.

Interior Decorating

Interior decorating is another field in which many women have won a preëminent place. It includes not only the use of materials and articles to produce effects, but the design of furniture and wall decoration (see *Interior Decoration*). It is gaining something of the status of the architect. A high degree of artistry is a requisite, and a broad cultural course in college is desirable but not an absolute requirement. The business is frequently entered through the decorating department of stores or through placement by art schools.

The Various Arts

The choice of one of the arts—music, painting, sculpture, drama, the dance, and others—requires the development of special abilities that are usually obvious in the possessor. Authorities are generally agreed that it is wise to obtain competent opinion as to ability before embarking upon such careers. Special schools for the various arts are to be found in many cities, and most universities and colleges offer comprehensive courses covering many phases of artistic work. Broad, cultural studies should accompany the specialized work. Entrance into the business is most frequently by school placement. Preëminence is given to only a few in the arts, but there are places where those who do not attain the

peaks may find a reasonable degree of success. (See *Drama*; *Drawing*; *Fine Arts*; *Music*; *Painting*; *Sculpture*.)

Authorship is generally considered as one of the professions, together with many types of journalistic work. (See *Newspapers*; *Writing*.)

Social Service Professions

Among the most important social service professions are those represented by the clergyman, priest, rabbi, missionary, Christian association worker, charity worker, and playground director. Much of their work is concerned with personal problems as well as with efforts for the betterment of communities. Ability in public speaking and a sympathetic analysis of group and personal problems are important factors in their efforts. A strong liking for such work should be the moving factor in considering these vocations. Those entering the ministries of various faiths are required to take college courses of varying lengths, generally four years, at specified institutions in some cases. The welfare and charity worker often deals with difficult tasks of adjustment in congested metropolitan sections. They have frequently established centers in which a wide variety of community activities is carried on. (See *Social Settlements*.)

LEARNING TO JUDGE DAIRY COWS



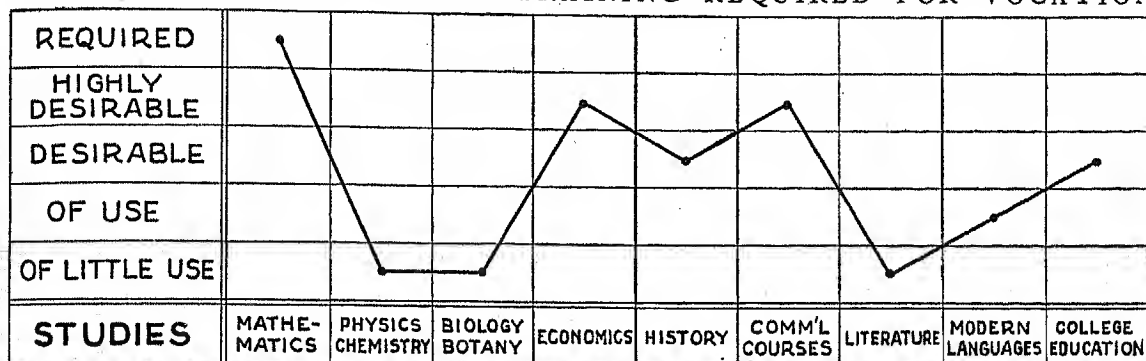
This class of boys in the famous Michigan State Agricultural College is learning how to judge the points which make a cow a good milker. The ability to select the best cows and keep the herd at a high standard is an important factor in the dairyman's success.

The usual entrance into social service work is a type of apprenticeship under competent supervisors. Broad sympathy, a sense of justice, responsibility, humor, and a degree of personal magnetism are requisite character traits. College courses dealing with the various social sciences are available and becoming necessary for the worker who intends to progress in this field. Positions are open in city, county, state, and federal welfare bureaus, in hospitals and sanitariums, public and private clinics, institutions, and benevolent organizations. Salaries are usually low. Women predominate in this field (see *Addams*, *Jane*).

Skilled Workers in Present-Day Farming

A generation ago many sons and daughters of farmers were leaving the hard labor and restricted social life of farms for the towns and cities. However, the farmer is no longer isolated. The daily newspaper, the radio, the automobile, and good roads have so changed his life that he is as much in touch with what is going on in the world today as is his city

REPRESENTATIVE CHART OF TRAINING REQUIRED FOR VOCATION



Above is a graphic chart showing how important various studies are for the vocation of accountant. Similar charts may be made for any of the vocations after a study of the text and the acquirement of additional first-hand knowledge of the vocation in question. They may serve as a guide for outlining courses in preparation for a career.

brother. Much of the hard labor has been taken out of the former toilsome tasks of the farm by great improvements in labor-saving machinery, by the increase in the use of power, and the modernization of farm homes.

Farming is rapidly becoming the work of specialists, not only in general farming, but also in dairying, stock raising, truck gardening, fruit growing, and horticulture. The boy who enjoys out-of-doors activity, who likes to work with animals, who prefers to plan things for himself, and who is reasonably strong, will probably find farm work to his liking. (See Agriculture.)

Farm work is usually divided into animal husbandry, general agriculture, and horticulture. Animal husbandry deals with the science and method of breeding, care, feeding, and marketing of animals and certain animal products, such as butter, cheese, wool, hair, furs, leather, feathers, etc., and such by-products as glue, bones, lard, soap, wax, etc. (See Cattle; Dairying; Meat Packing.)

There are a multitude of enterprises connected with animal husbandry, with its ramifications into dairies, creameries, cheese factories, condensed milk plants, ice cream factories, stockyards, and the like. In each of these there are places for both specially trained

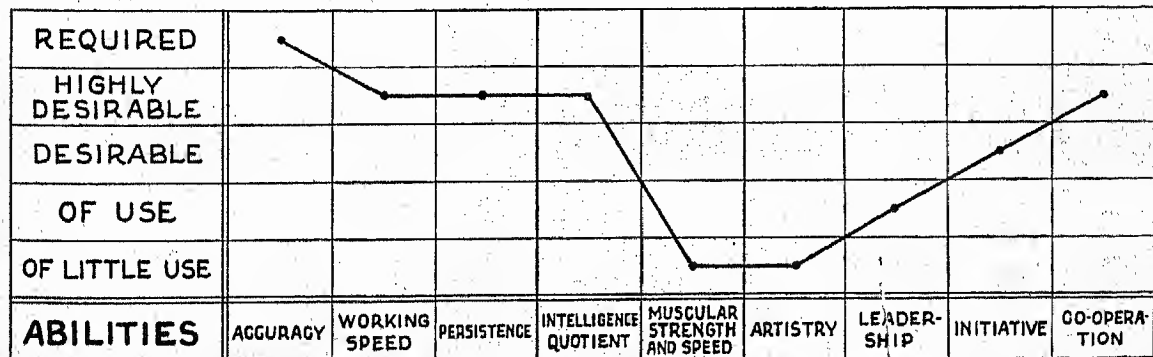
men and for others whose interests and training lie along the proper lines.

The classification also includes breeders of horses, mules, hogs, sheep, beef and dairy cattle. It extends to poultry raising, both for eggs and meat, including chickens, geese, ducks, turkeys, guinea-fowl, pigeons, and a few game birds (see Poultry). The occupations connected with fur farming, bee keeping, and the raising of pets, also comes under this head. A relatively small number find a livelihood in fishing (see Fish Culture; Fisheries).

In general these businesses require capital, in varying amounts, and the incomes are fluctuating. To offset that, there is a measure of independence that is not found in many enterprises. There are salaried positions available, such as federal and state inspectors, research and teaching in institutions, and the profession of veterinary medicine. Special education is quite desirable, and many states offer agricultural and animal husbandry courses to fit the prospective worker for success. Few women enter animal husbandry and its many branches, with the exception of poultry raising.

General agriculture deals with the cultivation of the soil for food and other valuable crops, with particular attention to bulk crops. Professional

CHART OF PERSONAL ABILITIES APPLIED TO VOCATIONS



A chart similar to this one for an accountant may be made showing how personal abilities contribute to success and happiness in the various vocations. The analysis must be made after a careful study of the vocation, and then compared with a similar personal chart like that given on page 318 of this volume.

agriculture is the research and teaching side of the vocation, while applied agriculture may be divided into general farming, grain farming, fruit growing, flower growing, vegetable raising, and many others.

Applied agriculture offers home, space, independence, a small cash income, but a healthful occupation. The producer has little control over prices, which fluctuate. The worker should be robust, fond of nature, and mechanically inclined. College training in agriculture is desirable, but not necessary. Entrance in the vocation is usually as either tenant or helper. The capital required for tenancy varies between \$2,000 and \$3,000, while an independent start may need from \$7,500 up. Positions are also available, generally for those with college training, with state and federal boards, grain and seed companies, banks and insurance companies, and others such as lumber companies, and certain real estate firms, dealing with farm properties.

Horticulture gives closer attention to individual plants than does agriculture in general. The field includes all types of gardening from the small truck farm or flower house to the largest fruit groves and orchards. (*See Fruits and Fruit Growing.*) Four years' study in college is desirable, as workers should have not only practical, but scientific and mechanical training. Positions available in the field include those as managers of farms, greenhouses, nurseries, orchards, landscape gardeners, fruit experts, tree surgeons, and similar places. There are both federal and state positions open, as well as teaching appointments for the scientifically trained worker. Women often make more than ordinary successes in horticulture.

An Outdoor Vocation for Men

Forestry is a branch of this division and consists in the art and science of managing forests to make them as useful as possible to man, in supplying wood, preventing or moderating floods, and in their direct effect upon soil and climate. Most positions are with the Federal government in the various national forests and parks, but there are an increasing number open with large corporations such as lumber companies, railroads, pulp and paper manufacturers, mines, water companies, clubs, private estates, and state and county forest preserves. Forestry is frequently divided into silviculture, or the growing and management of timber crops, cutting, reforestation, forest growth and yield, and fire protection; grazing research which deals with the production of forage crops and the management of rangelands; forest products investigations into wood utilization; and research in forest economics, including taxation, timber supplies, prices, and forest-land use.

The work is out-of-doors, strenuous, and with little or no home life. Private work offers the greatest reward, although at the present time more than 60 per cent of the foresters are in government employ. Entrance into the field is usually made through temporary employment with the government as field assistant or forest guard. Preference is usually given

to those who have completed two years of forestry work at one of the universities having forestry courses, and to those who have passed the examination for ranger. Permanent positions are under civil service, and the applicants must pass rigid examinations. The positions open for advancement are for forest rangers, junior foresters, junior range examiners, foresters, logging and civil engineers, supervisors of forests, grading inspectors, and others.

Forestry has strong attractions for men who like the out-of-doors, and the turnover in employment is low, indicating a satisfied force of workers. A college degree in forestry is generally required. A strong constitution and ability to stand hardship are requisites. Few women enter the vocation. In preparation it is not necessary to specialize in high school. Science studies are useful, but a broad educational basis is desirable. (*See Forests and Forest Protection.*)

Public Service Group

The majority of the people engaged in various forms of public service occupy positions similar to those available in private enterprise, with the exception of the police, firemen, and a few others (*see Fire Department; Police*). Most available places are under civil service, and the relatively low pay is offset by certainty of employment and gradual promotion. Entrance is usually by examination. (*See Civil Service.*) A lessening number of posts are by appointment through officeholders. Entrance into the army, navy, and marine corps is by enlistment. Officers must, in general, have special training (*see Military Academy; Naval Academy*).

The diplomatic service and consular service are attracting greater numbers of young men who are qualified by education and background to enter this interesting field. Candidates for such positions are designated for examination, and must secure appointment after passing such examinations. Applications must be made to the secretary of state, and through the Office of Foreign Service Personnel at Washington, D. C. Positions usually available are those of interpreters, student interpreters, clerks, and consuls. A knowledge of at least one foreign language is usually an essential, as well as other special subjects such as law, economics, and the like.

The Great Field of Transportation

Transportation, including communication, forms one of the great divisions of work. A breakdown in the movement of commodities or the means of communication from city to city and place to place would paralyze the country. Raw materials must be assembled in one place for manufacture and after manufacture must be transported to the consumer. (*See Transportation.*) Nearly one-tenth of our workers are engaged in one form or another of this business, which includes all railroads, street railways, bus lines, elevated lines, the postal service, the great telegraph and telephone companies, those who build and maintain our roads and streets, garages, and many others. In these different classifications there is a multiplicity

of vocations, ranging from that of the unskilled laborer to the highly trained and specialized engineer. Experts in nearly every branch of engineering, such as electrical, civil, mechanical, acoustical, marine, and others; skilled craftsmen in all the mechanical trades, mentioned hereafter; office employees; laborers; in fact—nearly every vocation will be found in the transportation field.

On the marine side, except for technical

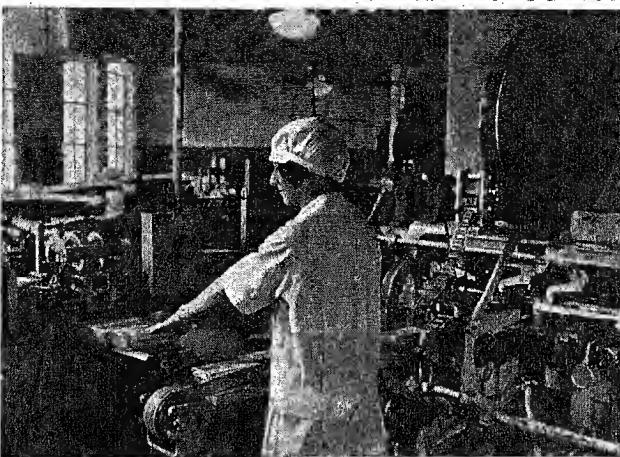
and administrative positions, the work offers little prospect of advancement. Sailors on modern freighters or passenger ships carry on their work according to schedule, and their travels are largely confined to routes touching a few ports.

Aviation is one of the most popular vocations among schoolboys of today. Prospective air pilots are put through severe training and only those who possess steady nerves, quick reaction time, and a fine sense of equilibrium succeed. However, the big field in aviation is not in piloting but in manufacturing, maintenance, operations, and sales activities. For every pilot on scheduled air lines there are said to be more than 40 ground men. (*See Airplane.*)

With the building of many hard-surfaced highways, increasing numbers of young men are finding employment as truck drivers, freight handlers, mechanics, and clerical workers in the service of highway transportation companies. Electric street railways demand motormen, conductors, inspectors, switchmen, common laborers, foremen, clerical workers, and a trained technical staff. Steam railroad work, now highly organized, offers attractive careers to thousands of workers: engineers, firemen, conductors, brakemen, inspectors, ticket agents, rate clerks, signal experts, telegraphers, and many others.

The far-flung activities of the telephone and telegraph companies give employment to many workers. Operators transmit messages by means of code, linemen construct and maintain the thousands of miles of wires necessary to convey the messages, and telephone operators see that calls are completed. (*See Cables, Submarine; Telegraph; Telephone.*) Staffs of technical experts are constantly at work to improve service and install new equipment in both the operating and production branches of the business. Radio offers many opportunities to young men and women. Radio engineers, electricians, and experts in branches of electrical science, as well as announcers, program directors, speakers, entertainers, find employment in

SPECIALIZED WORKERS IN MASS PRODUCTION



The modern factory with its complicated machinery of production offers many places for the worker who receives special training on the job.

the great broadcasting studios. Since radio has become linked with business through advertising, it also requires a great many salesmen and advertising experts. (*See Radio.*)

Extraction of Minerals

Over a million workers find their livelihood in the extraction of coal, oil, gas, and minerals from the earth. There are miners, quarrymen, drillers, metallurgists, mining engineers and other technical experts,

and many laborers employed in these vocations (*see Mines and Mining; Quarrying*). Many of the positions require college training, while others are filled from the ranks of the workers. Less than one per cent of the workers are women.

The Business of Trade

Trade is ordinarily said to include banking and brokerage, insurance and real estate, automobile agencies and filling stations, wholesale and retail trade of all kinds. Banks, whether national or state, finance companies, and the like, employ many workers. Young men frequently enter as messengers or pages, while young women obtain positions as clerks and stenographers. Advancement is usually through various departmental stages, although the work is becoming more highly specialized. The qualifications required are usually the ordinary commercial courses, a knowledge of the operation of business machines, business law, and accounting. For the higher positions college training is considered desirable, particularly in branches of economics, law, business organization and management. The business of banks and investment houses reaches nearly every form of endeavor, and the larger institutions have use for experts in many lines, lawyers, engineers, appraisers, statisticians, and many others. The work is confining, usually, and promotion is slow but fairly certain. (*See Banks and Banking; Insurance.*)

Wholesale and retail establishments employ clerks, most of whom do not need special educational training outside of that offered by the concern itself. In the larger stores and wholesale houses, experts in different lines are employed as buyers, some of whom have practical and others both practical and theoretical training. The work of the accounting force and other office employees is practically the same as in other businesses. About the same type of work is carried on by all of them: purchasing goods and supplies, obtaining customers, shipping goods, keeping accounts, determining credit ratings, typing letters, filing corre-

spondence, managing offices, adjusting complaints, and reckoning costs and profits (*see Accounts*). Office managers have discovered that more and better work can be done in less time by having the workers specialize in certain operations. As a result, bill clerks, ledger clerks, route clerks, cost clerks, dispatch clerks, payroll clerks, adding machine operators, and other workers perform tasks of a specialized nature in modern business offices. It is probable that office routine will become even more highly specialized in the future. For those who display special aptitude in their work the opportunities for advancement in office work are large.

Personal and Domestic Service

Nearly 5,000,000 workers are engaged in various forms of personal and domestic service. Two-thirds of these are women, and are engaged in our homes, hotels, restaurants, and in various places of business in a variety of callings. Caretakers, cleaners, janitors, elevator operators, cooks, laundresses, nursemaids, gardeners, chauffeurs, butlers, valets, waiters, and the like, form a large proportion of these. Many of the vocations require some special training, and a number of special trade schools are available for such instruction, such as those for barbers, hairdressers, manicurists, and many others. There is little opportunity for advancement in most types of personal service, although ability is usually recognized by a larger measure of success than the average. Wages compare favorably with those received by the average factory worker.

Home Economics Now a Vocation

A few years ago, when women in large numbers entered many of the vocations for the first time, much was said about a girl's choice between home making and a career. It is now generally realized that home making is, in itself, a career. Lack of proper preparation causes waste and failure here as well as in other vocations, even if the homemaker practises her art only in the confines of her own family. Many new fields re-

cently opened to the trained economist require highly technical training. Since the work of home economics is constantly increasing, there is little overcrowding in most of its branches. (*See Home Economics.*) The majority of those completing special courses in this subject in college, who seek careers outside the home, become teachers of cooking, sewing, and home economics in schools and colleges, secure positions with various state and federal bureaus, enter editorial work, or find places in restaurants, cafeterias, hospitals, and institutions. Some of them secure employment as specialists with large corporations, such as packing houses, textile manufacturers, and with concerns having special regard for employee welfare. There is little need for specializing in high school if the student intends to take the regular courses in home economics offered by many colleges and universities and the general background is desirable.

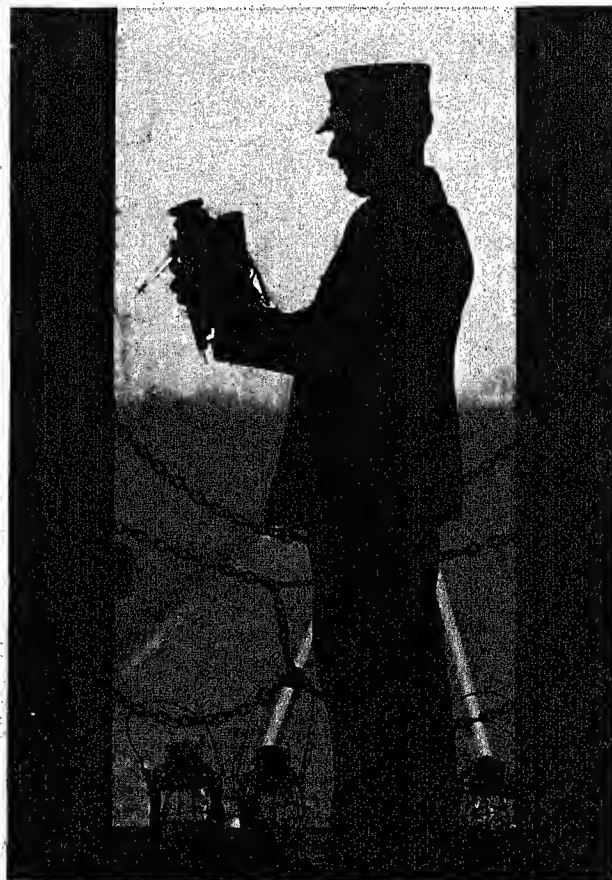
Manufacturing and Mechanical Industries

Nearly 30 per cent of the workers in the United States are engaged in the manufacturing and mechanical industries (*see Industries and Industrial Arts*). These include the building trades and industry, chemical and allied industries, cigar and tobacco fac-

ories, clay, glass, and stone industries, and the great business involving clothing. It also includes bakeries, packing houses, food and allied businesses, automobile factories and repair shops, blast furnaces and steel mills, all the metal industries, shoe factories and other businesses using leather, saw and planing mills, the wood-working industry, printing, publishing, and engraving, paper and pulp. Textile factories, using cotton, linen, silk, woolen and worsted, electrical machinery and supply factories, rubber factories, and miscellaneous other manufacturing enterprises are all included in this great classification. In it are also found the various hand trades which will be mentioned later.

In many of these vocations the workers operate machinery in the various processes of manufacturing. Their

THE ROAD OF HIS ENDEAVOR



Again the photographer has caught something that epitomizes the life work of those who select transportation as their calling.

positions usually require no previous training, and can be learned in the factory in a short time by the average person. A number of more highly skilled workers are used in testing, checking, and inspecting. Trained experts are used in research and in certain technical departments. Efficiency experts develop methods and suggest devices to make production more rapid and economical. Foremen, managers, and superintendents direct and supervise the activities of the workers. Factories also need clerical workers and salesmen. Unskilled or common laborers do the rougher work.

Employment experts in large industrial plants are constantly striving to find the right worker for each task. Certain people, they have found, are suited to routine procedure; to others, a more varied work calling for initiative and quick decision is agreeable.

The Hand Trades

The building industry, besides utilizing the services of architects, engineers, and other highly trained experts, employs large numbers of craftsmen, such as carpenters, bricklayers, plumbers, electricians, painters and decorators, sheet-metal workers, plasterers, steamfitters, and structural iron workers (see Building Construction). In the metal trades, there are draftsmen, patternmakers, molders and core-makers, machinists, tool and diemakers, forgemen, welders, boilermakers, and many others. In the printing and publishing trades will be found compositors, pressmen, lithographers, engravers, and others. Most of these workers enter the business as helpers or apprentices, depending on local conditions and various trade union regulations. In the building trades, the

workers are hired for the extent of the work in hand, while in the other lines steady work is generally the rule. The opportunity for advancement lies in promotion, in most cases, to positions as foremen and superintendents. Men of unusual ability are able to progress even further. In many trades, journeymen workers are able to start businesses of their own and employ other workers. Boys who plan to enter the various hand industries and the metal trades should possess mechanical ability and have a liking for detail. Pay is usually above that of clerical workers, although employment is not always as certain.

Disadvantages of Unskilled Labor

Of all types of gainful occupations, unskilled or common labor is the least desirable. Many men or women, who have neglected or have been unable to prepare themselves for any of the specialized or skilled types of work, find themselves engaged in common labor. Theirs is usually a hard lot. The work they do usually requires considerable physical strength. As a result, the worker who is past middle age often finds himself at a disadvantage in competition with younger and more able-bodied persons. Employment is frequently irregular and wages usually are low.

Because of these disadvantages employment directors and vocational guidance counsellors urge every person to prepare himself or herself for some definite and congenial type of work, so that a greater service may be rendered to society and a more substantial income earned. They emphasize training for some vocation before leaving school, or in getting started in work with some promotional possibilities.

—REFERENCE-OUTLINE for Organized Study of VOCATIONAL GUIDANCE—

HAPPINESS and success in the work we do are not necessarily the gifts of good fortune; rather, they can reasonably be looked for if we choose our life work, or vocation, after a careful study of the leading occupations and our fitness for them. In this study, it is wise to learn the characteristics of various occupations and the demands they make upon those engaged in them, then to consider our own abilities and interests in the light of these demands. Consistent success in this or that school subject is a generally reliable guide, but temperamental fitness and physical set-up should also be regarded as determining factors. No one can begin too early in life to think of the kind of work he should enter or to lay the foundations for competence in that work.

I. HISTORY OF TRAINING FOR VOCATIONS:

- A. Home Training: V-313.
- B. Apprenticeships: V-313-14, E-166, E-172, E-181, G-88.
- C. Special Training in Universities, Colleges, and Special Schools: V-318, E-181-4. Smith-Hughes Act V-315.

II. OBJECTIVES OF VOCATIONAL GUIDANCE MOVEMENT: V-315.

III. PITFALLS TO BE AVOIDED IN CHOOSING VOCATION: V-316.

IV. BASES FOR WISE VOCATIONAL CHOICE:

- A. Natural Bent: V-317.
- B. Degree of Success in Specific Studies: V-317.
- C. Personality Traits: V-318.
- D. Physical Characteristics: V-318.

V. GENERAL ASPECTS OF CHIEF VOCATIONAL FIELDS:

- A. Agriculture: V-324-5, A-47-60, E-182. Cattle C-101-5; Dairying D-1-5; Gardening G-6-13; Hogs H-316-17; Horses H-341-5; Irrigation I-147-50; Poultry P-336-9; Rotation of Crops N-148; Sheep S-104-6.
- B. Architecture: V-323-4, A-257-76.
- C. The Fine Arts: Music M-308-21; Opera O-228-34; Painting P-13-31; Sculpture S-52-66.
- D. Building Construction: V-322, V-329, B-263-8. Brick and Tile B-236-9; Cement C-124-8; Concrete C-328; Heating and Ventilation H-263-6; Iron and Steel I-133-46; Plumbing P-260.
- E. Business and Clerical Occupations: V-327-8, E-183, E-184. Advertising A-23-5; Banks and Banking B-39-45; Boards of Trade B-160-1; Bookkeeping and Accounting A-5-7; Building and Loan Associations B-262; Insurance I-94-6; Shorthand S-134; Stocks and Bonds S-290-2; Typewriting T-175.
- F. Ceramic Industries: Brick and Tile B-236-9; Pottery and Porcelain P-327.
- G. Clothing Industry: C-277-81. Dress and Dress Designing D-108-13; Gloves G-106; Hats and Caps H-235-7, C-275; Shoes S-130-3.
- H. Communication: V-326-7. (See Reference-Outline for Industries and Industrial Arts.)
- I. Engineering: E-182, V-321-2, E-267-8. Bridge Building B-239-43; Building Construction B-263-8; Canal Construction C-67-9—Panama Canal P-41-53, Suez Canal S-318, Welland Canal W-70; Dams D-6; Dredging D-103-5; Electrical Engineering E-267; Irrigation and

- Reclamation I-147-50; Mining M-185-9 (*see also* Reference-Outline for Industries and Industrial Arts); Railroad Engineering R-38; Roads and Streets R-111-16; Ship Construction S-124-7; Surveying S-331-2; Tunnels and Subways T-152-4.
- J. Food Industries:** (*See* Reference-Outline for Industries and Industrial Arts.)
- K. Home Making:** V-328, H-325-9. (*See also* Reference-Outline for Home Economics.)
- L. Industries and Industrial Arts:** I-75-8. Inventions I-113-18.
- M. Interior Decorating:** I-98-107.
- N. Journalism:** V-324, N-108. Newspapers and Magazines N-104-9; Writing W-184-91.
- O. Law:** V-323, L-73-4, E-181, E-182. Courts of Justice C-385-6; Jury Trial J-229-31; Juvenile Courts J-232.
- P. Library Work:** L-1061.
- Q. Lumbering:** L-212-19. Forests F-154-9; Trees T-130-7.
- R. Manufacturing:** V-328. Industries and Industrial Arts I-75-8; Inventions I-113-18.
- S. Medicine and Surgery:** V-322-3, M-108-9, E-182. Anatomy A-191; Anesthetics A-196; Antiseptics A-222; Antitoxins and Serum Therapy A-223; Dentistry D-54; Drugs D-114; Germ Theory G-77-80; Health Departments H-254-7; Hospitals H-345; Hygiene H-370; Nursing N-186; Physiology P-202-9; Radium R-32-5; Vaccination V-267; X-Rays X-198-202.
- T. Metal Trades:** V-327. (*See also* Reference-Outline for Industries and Industrial Arts.)
- U. Oil Refining:** Petroleum P-149-50.
- V. Personal Service:** V-328.
- W. Public Service:** V-326. (*See also* Reference-Outline for Political Science.)
- X. Publishing:** Books and Bookmaking B-175-91; Newspapers and Magazines N-104-9, M-25-7; Printing P-346-8 (*see also* Reference-Outline for Industries and Industrial Arts.)
- Y. Social Service:** V-324. Social Settlements S-181, A-17.
- Z. Teaching:** V-322, E-185-6. (*See also* Reference-Outline for Education.)
- AA. Textile Industry:** T-61-8. Cloth T-69-71; Cotton C-375-82, C-274; Flax F-105-6; Rayon R-53-5; Silk S-144-50, C-274; Spinning and Weaving S-258-9; Wool W-140-5.
- BB. Transportation:** V-326-7, T-121-6. (*See also* Reference-Outline for Industries and Industrial Arts.)
- CC. Unskilled Labor:** V-329.

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VOICE. Do you see these words? Do you know what they mean? You say "Yes." I ask "Why?" How far back in human history would you need to go to give a perfect answer to this "Why?" Very far, I am sure.

Each printed word means something because it stands for a spoken word. A spoken word is a part of the language or "tongue age." We say that English is our native "tongue." A language consists of a number of sounds and groups of sounds to which all people speaking the given language attach the same meanings. We could not make appropriate sounds for language purposes unless we had a voice organ. We could not understand them unless we had hearing

organs. So you see upon these two classes of organs depended the development of language, with all that it has meant for human progress and happiness. While gesture may be older than spoken language, we can hardly imagine a deaf and voiceless race as making much progress in civilization.

The chief voice organ is not the tongue, as the word language would imply, although the tongue has quite a part. The voice organ is the larynx, the cartilaginous box between the windpipe and the base of the tongue. It is composed of nine cartilages, all connected by muscles. The thyroid, cricoid, and arytenoids are the chief cartilages. The largest is the thyroid;

this consists of two square plates united in front to form the projection called the "Adam's apple." The thyroid cartilage comprises most of the front and side walls of the larynx.

Across the inside of the voice box extend two tough, thin, fibrous bands, fastened at the front and rear. These bands are the vocal cords. Certain muscles by moving the cartilages can tighten these cords.

In ordinary quiet breathing these muscles and vocal cords are relaxed, and there is a wide slit between the cords, through which the air passes in and out without making any noise. But if we wish to speak or sing, the muscles tighten the vocal cords and the air as it is forced out of the lungs sets the cords vibrating. This vibration is the basis of the human voice, but the sound so produced would not be loud enough. The cavities of the throat, nose, and mouth take up the sound and reinforce it, as the sounding box of a violin or guitar reinforces the sound of the vibrating strings.

The loudness of a tone depends on how hard the air is forced out over the vocal cords. The pitch of a sound depends on the tightness of the vocal cords. For a high tone the muscles of the larynx are strongly contracted and the cords are very tense. For a low pitched tone the reverse is true.

The quality or "timbre" of a voice, by which we can tell one voice from another, is due to the shape of the cavities above the cords. Every movement of the tongue and neighboring muscles modifies the shape of the mouth and throat and consequently modifies the quality of the voice. The quality can therefore be changed by practice, as singers know.

A man's vocal cords are larger and heavier than those of a woman. Hence a man's voice is lower pitched. This difference is exactly like the difference between the sounds produced by long heavy wires of a piano, and those made by the short, smaller wires.

A boy's vocal cords are at first short and light like those of a woman; therefore the boy sings soprano or alto. At about 13 years of age the boy's vocal cords begin to grow rapidly. For a while his voice cracks and is unmanageable. Later it settles down to the pitch of an adult man. Then he sings bass or tenor.

Singing consists in the production of tones whose vibration numbers have a definite, simple relation to one another. What we call harmony of sound depends on these mathematical relations. For example, if one is an octave above another, it is because the vocal cords make twice as many vibrations per second for the first as for the second tone. (*See Sound.*) The ordinary range of a human voice is about two octaves.

Birds and many other vertebrates have voice organs connected with the respiratory apparatus. Man is the only animal that has developed a complete language, although in other animals the voice serves as a means of signaling. For example, everybody has heard the clucks of an old hen as she calls her chicks and how the sound changes if a hawk swoops near.

Certain monkeys are said to have such a definite series of sound signals or symbols as really to constitute an elementary language. A parrot can be taught to speak a number of words, but they probably do not mean much to the parrot; and such a process of imitation can hardly be called language.

FIERY MOUNTAINS *that Build THEMSELVES*

*The Use of Steam Power in Their Building Operations—When is a Volcano Dead?
It's Hard to Say—Relation of Earthquakes and Volcanoes—How Old
Vesuvius Shakes the Earth—The World's Great Firing Line*

VOLCANOES. A volcano is a vent or opening in the earth's crust from which hot rock is ejected. In many but not all cases, the hot rock is in the form of lava. The lava may flow out quietly, or it may be ejected forcibly. In the latter case much or all of it may be solid. Small fragments of solid lava are called cinders, but if they are as small as particles of fine sand or dust, they are called ashes, or better, volcanic dust. Volcanic ash does not, however, imply combustion. It is nothing more nor less than powdered lava. Besides the lava which issues from volcanoes, either in the liquid or solid form, many gases or vapors escape from the vents. Among the latter, vapor of water is most abundant. Steam is, indeed, the principal force in the violent expulsion of materials from volcanoes of the explosive type. Chlorine and sulphur and various compounds of these elements are among the commonest fumes escaping from volcanic vents. Carbon dioxide also is one of the common gases. Many of the gases are noxious, so

that it is sometimes difficult to approach the openings whence volcanic products issue.

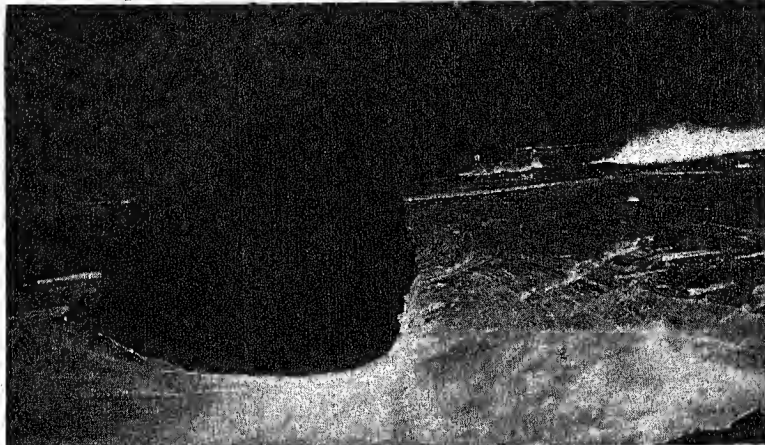
The solid material and the liquid lava which escape from volcanoes accumulate about the vents and build up volcanic cones. In the top of a volcanic cone there generally is a depression, called the "crater," in the bottom of which the vent is situated. When a volcanic cone becomes high, the lava may break through its sides instead of flowing over the top. Cones built up by lava flows have low slopes; cones of cinders have steeper slopes, but rarely more than 25 or 30 degrees. When a volcano ceases to be active, it is said to be extinct if the quiescence is permanent. When it becomes extinct, however, it really ceases to be a volcano. When the activity of a volcano is temporarily suspended, the volcano is said to be dormant; but it is often difficult to tell whether a volcano is extinct or only dormant. Vesuvius was thought to be extinct until the time of its destructive eruption in 79 A.D. When this occurred, it was seen that the volcano had

been dormant only, instead of dead. A volcanic vent often continues to give off vapors and gases long after lava ceases to issue. Vapors and gases also escape, and often in large quantities, during periods when no lava is being ejected.

Lakes in the Volcano's Mouth

When volcanoes cease to be active, their craters may be occupied by water, giving rise to crater lakes. Such a lake, Crater Lake, exists in Oregon. Volcanic cones retain their perfect form for a short time only.

THE "HOUSE OF EVERLASTING FIRE"



On the eastern slope of the great volcanic mountain of Mauna Loa, Hawaii, is the crater of Kilauea, 3 miles long and 2 miles wide, at the southwest end of which is the boiling lava lake called Halemaumau or "House of Everlasting Fire."

Erosion by rain and melting snow soon modifies them. Volcanic cones in all stages of degradation occur in many mountainous regions. Mount Shasta in California, Mount Rainier in Washington, and San Francisco Peak in Arizona are good examples of volcanic mountains in process of degradation. In southern California and northern Arizona there are volcanic cones formed so recently that they have been modified scarcely at all by erosion. In many of them the craters still are preserved. These fresher cones are largely of cinders.

Volcanoes are often associated with earthquakes, and the violent eruptions of volcanoes sometimes are the direct cause of earthquakes. In many cases, however, it may be true that the two phenomena, the earthquakes and the volcanic eruptions, are to be referred to a common cause rather than either to the other. In the explosive eruptions of Vesuvius the quakings are felt for considerable distances from the crater. In many cases of violent eruption the old cones are partly or wholly blown away. Even large parts of islands where they occur may be demolished. Outside the present cone of Vesuvius there is a remnant of an older cone, partially destroyed in a violent eruption subsequent to its formation. A large part of the island of Krakatoa, between Sumatra and Java, was blown away in the eruption of the volcano of the same name in 1883. The shock of this cataclysm was felt straight through the earth's diameter.

The great destructiveness of volcanic action is more commonly due to the material blown out than to the lava which flows out. The flow of lava usually is slow, and in most cases it flows but a short distance before it congeals. But the solid matter may be widely distributed. It was by ashes ejected from Vesuvius that Pompeii, with its 2,000 people, was buried in 79 A.D. Torrents of rain, due to the condensation of the escaping water-vapor, often fall with the ashes, converting them into a sort of hot fluid mud, and this

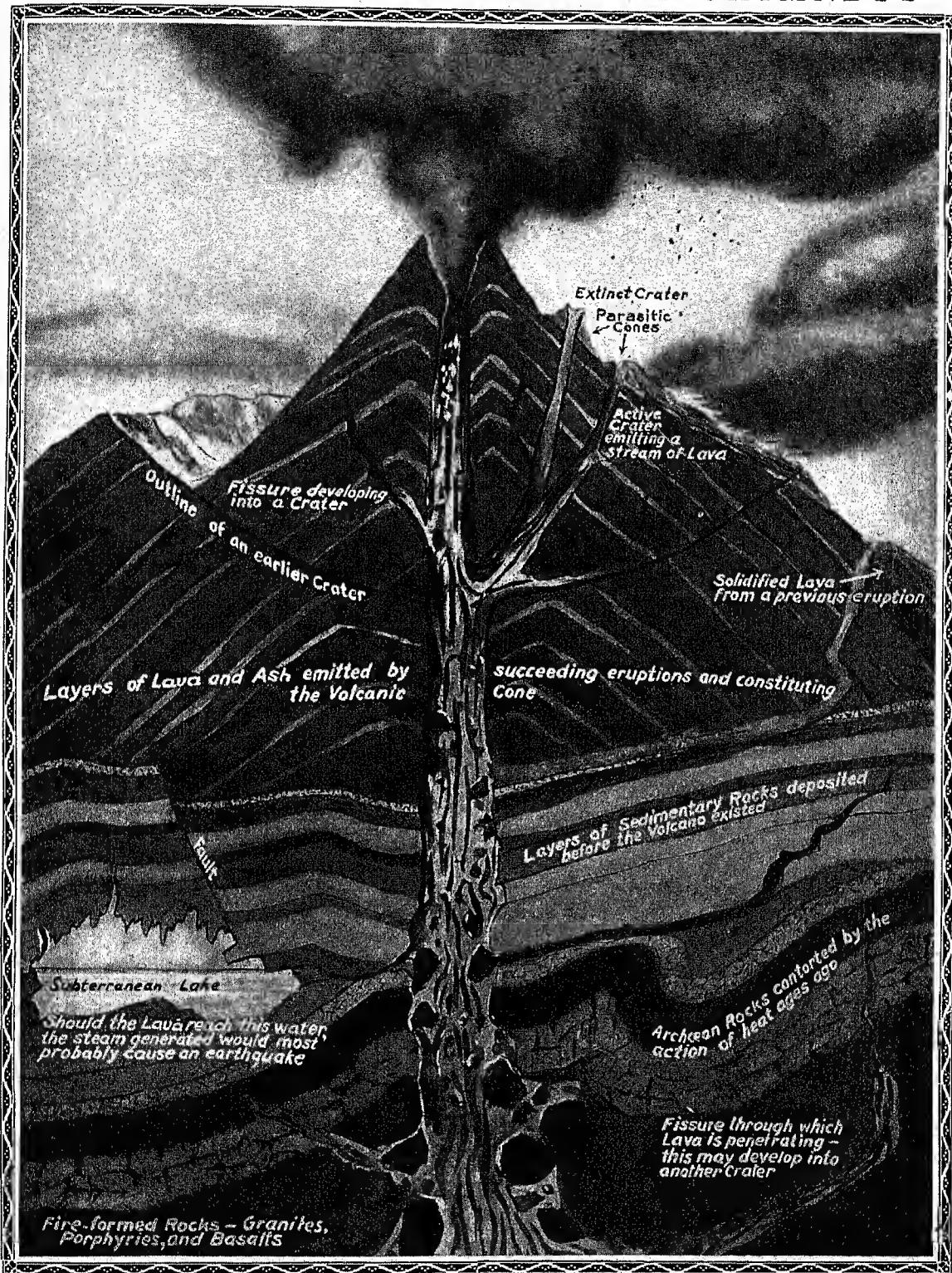
sometimes is most destructive in its flow. In the Krakatoan eruption of 1883 it has been estimated that bits of pumice and dust were sent up into the air 20 miles by the violent explosion; some of the dust was carried by currents in the upper air completely around the earth. Large blocks of lava sometimes are hurled miles from the volcano whence they are ejected.

The number of active volcanoes is estimated to be between 300 and 400. About one-third of the active volcanoes are situated on the continents, the others on islands. Most of the volcanoes on continents are relatively near their borders, though extinct volcanoes occur at great distances from the coasts. Continental

volcanoes are, on the whole, more numerous about the borders of the Pacific Ocean than about the Atlantic. Many islands are really nothing more than the crests of volcanic cones which have been built up above the surface of the water. There are doubtless very many volcanic cones the tops of which are still below sea level. Of such submarine volcanoes little is known. The lava which issues from volcanoes comes from the interior of the earth, but from what depths is unknown. Active volcanoes are more numerous in regions where the formations are relatively young than where they are old. They are thought to occur in regions where the crust of the earth is in movement, that is, where it is either sinking or rising, rather than in regions where it is stable.

No existing volcano seems to have been active for a period of time which would be considered long, as geologists reckon time, though many of those now known have been active since the beginning of the historic period. There is reason, however, to believe that all existing volcanoes will in time cease to erupt and new ones will doubtless come into existence. Volcanoes have been more numerous at some stages of the earth's history than at others, but some of the periods of great volcanic activity were early in the earth's history, and some late. On the whole, it cannot be affirmed that volcanic activity has increased or decreased as the history of the earth has advanced, though the volcanic regions have shifted about.

ONE OF EARTH'S VAST FIERY CHIMNEYS



This picture-diagram is a graphic history of a typical volcano. At its roots lie the ancient fire-formed rocks, with sedimentary rocks above them, and just below the huge low basin of the volcano's youth. A flaming cloud of vapor and ash issues from the main crater of the new cone, and one "parasitic" cone at the side is pouring forth a stream of lava, while here and there, above and below, lava is struggling to break forth through fissures. An underground reservoir of water threatens an earth-shaking convulsion if the hot lava should reach it, for then it would burst into steam with explosive violence.

A ROARING LAVA FOUNTAIN IN KILAUEA CRATER



The photographer had set up his camera on the shaking rampart of the molten lava lake, "in a temperature hot enough to fry an egg." Just as he was ready to photograph the crag that you see in the center of the picture, a terrific blast of seething lava burst with a bellowing roar within 30 feet of the camera, sending up this fountain of boiling lava spray.

Various plans have been proposed for harnessing volcanoes and using their immense reservoirs of energy for industrial purposes. This has actually been successfully done on a small scale in Tuscany on the west coast of Italy. Borings have been sunk into the volcanic mountain-side near Larderello and the steam issuing from the artificial geysers thus produced has been used as a source of heating for engines generating electric current. This current is carried to Florence, Leghorn, and other communities, where it is used for power and traction. Projects have also been proposed for thus harnessing the energy of the great volcano Kilauea in Hawaii.

VOLGA (*völ'gä*) **RIVER.** The greatest river of Europe rises in the cold marshes of the Valdai Hills, about 200 miles south of Leningrad. Sweeping with vast slow curves to the southeast and the south, it is joined by the Oka River at Nijni-Novgorod (now known as Gorky), and by the Kama below the towered citadel of Kazan. Past Samara, Saratov, and the mosques and minarets of Astrakhan it flows, watering the sandy Caspian steppes before it sinks through 200 mouths into the Caspian Sea after a journey of 2,325 miles.

Navigable, with its tributaries, for many thousand miles, "Little Mother Volga" is not merely the great commercial highway of Russia but a link between Europe and Asia. Down its course go the manufactures and timber of the north; upward travel grain from the Ukraine, hides from the steppes, fish from the river's own teeming mouths, oil from Baku, and cotton from

Persia. The Volga has no natural communication with the ocean. Canals, however, connect it with the Baltic and White seas, and the Volga-Don canal in the south will give Volga commerce access to the Black Sea. The Moscow-Volga canal brings ocean-going vessels to the nation's capital.

Fifty million people—of Slavic and other races—inhabit the fertile basin of the Volga and its tributaries, and an even more motley human stream—White and Red Russians, Great and Little Russians, Cossacks, Georgians, Circassians, Armenians, Persians, Chinese, Turkomans, and gipsies—flows up and down its surface; it is the mixing-bowl of Russia. Five centuries and more—from the 10th to the 16th—were needed to make the Volga Russian from source to mouth, and the Greek cathedrals, Lutheran churches, and Moslem mosques along its banks typify Russian history as the plaintive songs of the Volga boatmen seem to express the inmost Russian soul.

VOLTAIRE (FRANÇOIS MARIE AROUET) (1694-1778). Many people have hated injustice, tyranny, and narrowness as much as Voltaire, but few have had his waspish anger against it, his dancing eagerness to attack it, his hot bitter memory to keep up the fight, his sharp laughing brilliant wit which cut and pierced like a sword.

Voltaire's long life was a thrilling one, with the dust of struggle rising all along its road. It began at Paris, where the tiny pale baby that he was appeared daily to be about to die. And all his life long he was ill, thin, nervous, drugging himself with endless cups

of coffee. In his youth he shocked his simple old father by his gay idle habits, his indifference to the study of law, and his habit of writing bold, cutting, witty, dangerous verses for a pastime. In those days, when the tyrant Louis XV was king of France, it was not at all safe to make even the smallest joke about powerful men or the church, no matter how bad and unjust they might be. To be sure, it was Voltaire's own pen that first and finally aroused people against this tyranny, but that was later on.

Young Voltaire turned off so many biting and clever little poems that one day he was accused of some which reflected on the government—although he did not write them—and was thrown into the Bastille. While there he changed his name from Arouet to Voltaire, saying that he hoped to have better luck with his new name than with the old one. Eight years later he was again unjustly imprisoned there, and in a rage he departed for England. There he found freedom, for men of genius were honored and could say and write what they thought without fear of tyrants. After three years, in 1729, Voltaire returned to France with a new vision of liberty in his black, sparkling, mocking eyes, and its hot flame in his daring, generous, rash, unfrightened heart. It was there that his public life really begins.

A Genius with a Fighting Pen

That life is too busy and complicated to tell in detail. He wrote play after play, and some 'Letters on the English' which told the French king such unsugared truth that Voltaire was obliged to beat a hasty retreat from Paris to Lorraine. Indeed Voltaire was always setting off some social or literary bomb, then taking to his heels until it was safe for him to return. He was constantly in a tangle of quarrels, never allowing an insult to pass, and then turning around and heaping his beaten enemy with kindness. His books were continually being censored and burned, and he was continually writing others twice as brilliant and startling.

Among the first things Voltaire did after his flight to Lorraine was to print and circulate a statement of Newton's philosophy. At that time the philosophy of Descartes was taught in schools and insisted upon everywhere. Voltaire laughed at Descartes. As usual, his book on Newton was prohibited. But in ten years it was the accepted philosophy, and Cartesianism was all but dead. This is just one example of the way Voltaire could make his ideas prevail, until it has been said that he "filled the 18th century." He reasoned so keenly and could make the facts of science and history and the new moral and political ideas so entertaining that people read them, talked about them, and believed in them before they realized what was happening.

But Voltaire did not accomplish his wonders without constant persecution from the government. Therefore when, in 1750, Frederick the Great of Prussia invited him for a long visit to his court, Voltaire unwisely went. There he learned something about the favor of princes, and returned in three years homesick and angry. But the French king would not allow him

to return to Paris. So he bought the estate of Ferney, on French soil, $3\frac{1}{2}$ miles from Geneva, Switzerland, where he could easily dodge across the border if the king sent to arrest him. There he was to know as much peace as his restless soul could. He built a large house, entertained famously, gave a home to needy relatives and to the niece of Corneille, lifted his peasants from starvation to comfort, sheltered religious refugees from Geneva, started a prosperous watch factory, a silk stocking factory, and a lace colony; wrote and produced plays, managed lawsuits, defended people persecuted for their religion, and ran a farm. What was there that Voltaire did not attempt and succeed in?

Ends His Days in Honor

He returned to Paris when he was an old feeble man of 84. He was fêted, honored, adored, to his proud heart's content. He produced his last play there, and drew up a plan for a French dictionary which is still the model for English and American dictionaries. But the excitement and exertion killed him, just as the first muttering of the great French Revolution could be heard. Thirteen years later, in the midst of this Revolution, his body was carried in state through the streets and placed in triumph on the ruins of the Bastille where as a youth he was imprisoned.

Rousseau is called "the father of the French Revolution," but it is doubtful whether his teachings of "Liberty, Fraternity, and Equality" would have been heard if the mocking laughter of Voltaire had not first stung and quickened the public mind. Voltaire tore out the poisonous weeds of superstition, intolerance, and unreason, so that the ground could receive Rousseau's planting. He flew at injustice, ignorance, and tyranny with such strength and laid them so low that today we can scarcely fancy how deadly those things were. He was accused of being an "infidel," but in reality he was a "deist"—that is, one who believed that God reveals himself only in the world of nature and the hearts of men. The legend that he died in a state of terror and despair is undoubtedly false.

Voltaire was great as a dramatist, historian, poet, critic, and philosopher; but we like best to look back on Voltaire the man—the slender, ill, gay, spiteful little knight of justice, fighting with such good humor and such courage against giant wrongs, the rescuer of man's right to *think*. It is often said that Voltaire eras the thought of Europe in his time, just as Erasmus, Petrarch, and Goethe did in theirs.

Voltaire's chief works were: 'Oedipe' (1718); 'La Henriade' (first complete edition, 1728); 'L'Histoire de Charles XII' (The History of Charles XII), 1731; 'Zaïre' (1732); 'Le Temple du goût' (The Temple of Taste), 1733; 'Lettres anglaises' (Letters on the English), 1734; 'Remarques sur les pensées de Pascal' (Remarks on the 'Thoughts' of Pascal), 1734; 'Alzire' (1736); 'Mahomet' (1742); 'Siècle de Louis XIV' (The Century of Louis XIV), 1751; 'La Pucelle d'Orléans' (The Maid of Orleans), 1755; 'Essai sur l'histoire générale et sur les mœurs et l'esprit des nations' (Essay on General History and the Customs and Mind of Nations), 1756; 'Candide' (1759); 'Dictionnaire philosophique' (Philosophical Dictionary), 1764.

VOSGES (*vōzh*) MOUNTAINS. These mountains of France have long constituted the chief defense of that land against invasion from the east. It is said that in the World War of 1914-1918 a German general was ordered by the emperor to attack the French and drive them back over the crest of the Vosges. After three unsuccessful attempts he was ordered to cross the mountains at all hazards. Following the fourth failure the general, before committing suicide, sent this message to the Kaiser: "The Vosges cannot be crossed. Come and try it yourself."

Unlike the Alps with their lofty, snowclad peaks, the Vosges are rather low mountains with rounded summits—in aspect very similar to the mountains of the Black Forest which lie across the valley of the Rhine. In the process of mountain making, a thick shell or crust of the earth's surface was bowed up, forming a great broad arch with its crest in a nearly north and south direction. Along that crest there developed two parallel breaks, and a broad belt at the top of the arch between the two great breaks dropped down several thousand feet, forming the valley of the Rhine. The Black Forest mountains are the eastern part of the arch and the Vosges the western. The ascent of the latter range from the east is very steep and difficult. This fact and the lack of practicable passes leading over the mountains made it impossible for the Germans to cross, while the French, on the other hand, could easily ascend the gradual western slope to defend the crest.

The Vosges mountain range proper is less than 100 miles in length. It extends from Belfort northeastward almost to Saverne, and at its widest point near Colmar is about 30 miles wide. While Alsace was in the possession of Germany, the boundary between the country and France lay along the crest of the Vosges Mountains. The name Vosges, however, is sometimes extended to cover the uplands to the north of the mountains, reaching as far as Mainz. Cool lakes and mineral springs attract summer visitors up from the plains, while others come for winter sports. From the wild, rain-soaked crags of the Vosges, somber with fir and spruce forests, the traveler descends beside tossing streams to the busy valley towns.

Water power and wood, for fuel and raw material, have drawn here sawmills and paper mills and textile and wood-working factories. Sheep and cattle are pastured in summer above the timber line on the rounded, grassy summits of almost uniform height (about 3,000 feet). The mountains shield Alsace from the sea winds, making that province twice as dry as Lorraine, but protecting its luxuriant vineyards and orchards.

Piercing the passes are highways, railways, and a canal connecting the Rhine and the Marne rivers. The Vosges range is composed mainly of granite and sandstone, and contains large deposits of iron, coal, lead, salt, and copper. The Moselle River rises on the western slope of these mountains.

VULTURE. Soaring in broad spirals far above the grassy African velds, the large Egyptian vultures watch the lion make his kill, swoop down to a near-by tree, and enviously wait until the satiated lion moves away. Then they pounce down and quickly devour the remnants of the feast.

Vultures are represented by the Old World family *Vulturidae* and the American family *Cathartidae*. They are huge birds with a wing span of from 7 to 12 feet, and many have black plumage. All are carrion-feeders, but they perform a great service to mankind by ridding forests and streams of dead animals. Nature has fitted them admirably for their work. Their hooked beaks are powerful tearing and cutting machines, and in all but one genus the head and neck have no feathers (for pictures see page B-130). Their keen telescopic eyes locate their food while they soar at great heights.

Except during the nesting season, vultures are generally found in flocks. Most species do not build a nest, but lay one to three eggs on high mountain ledges, in caves, or under logs and stumps on the ground. The young are born naked, and sometimes require a year of parental care.

The mountains of southern Europe, northeastern Africa, and Asia are the hunting grounds of the *Lammergeier*, which in German means lamb vulture. This is the only vulture with head and neck completely covered with feathers. Because of the stiff bristles that fringe its beak, this large bird is also called the bearded vulture.

The Vultures of America

Nine species of vultures inhabit tropical, subtropical, and temperate regions of North and South America. The turkey vulture is the most common species in North America. Although no beauty, with its naked head and neck colored bright red, and its unkempt glossy black plumage edged with brown, this bird, about two and one-half feet in length, is a magnificent figure in flight. The smaller black vulture, about two feet long, is black, with a blackish skin covering head and neck. It ranges over the southern United States south to Central and South America, and is most frequently found haunting settled regions, particularly towns and cities.

One of the largest of flying birds is the California vulture or condor, which is restricted to the coast ranges of California. This majestic bird, with huge beak, bare, orange-colored head, and black plumage, once was common on the Pacific coast, but during the California gold rush the miners found the condor's large hollow quills made a handy receptacle in which to carry gold dust, and thousands of the birds fell victims to their rifles. A great many more were killed by poisoned bait intended for the destruction of coyotes, wolves, and mountain lions which harassed the rancher's cattle. Today only a few stragglers are left. (See Buzzard; Condor.)

THE EASY REFERENCE FACT-INDEX

GUIDE TO ALL VOLUMES FOR SUBJECTS
BEGINNING WITH

T-U-V

TO SAVE TIME

USE THIS INDEX 

EDITOR'S NOTE ON NEXT PAGE TELLS WHY

SPECIAL LISTS AND TABLES

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Numerous other lists and tables in the fields of geography, history, literature, science, mathematics, and other departments of knowledge will be found with their appropriate articles in the main text



EDITOR'S NOTE

EVERY user of Compton's Pictured Encyclopedia should form the habit of *first* turning to the Fact-Index section at the end of each volume when in search of specific information. This index is a miniature work of reference in itself and will often give you directly the facts, dates, or definitions you seek. Even when you want full treatment of a subject, you will usually save time by finding in the index the exact page numbers for the desired material.

All page numbers are preceded by a letter of the alphabet, as A-23. The letter indicates the volume. If two or three page numbers are given for the topic you are seeking, the first indicates the more general and important treatment; the second and third point to additional information on other pages. Where necessary, subheadings follow the entry and tell you by guide words or phrases where the various aspects of the subject are treated.

The arrangement of subheadings is alphabetical, except in major historical and biographical entries. In these the chronological order is followed.

The pictures illustrating a specific subject as a rule appear on the same pages as the text to which you are referred. But often illustrations placed elsewhere will prove of additional interest and value. These are indicated by the word *picture* followed by a page number.

A picture reference is frequently intended to call attention to details in the text under the illustration as well as to the illustration itself. This picture-text, therefore, should always be carefully read.

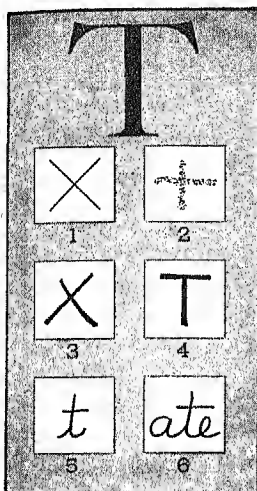
The pronunciations given are those preferred by the best and most recent authorities; alternative pronunciations are indicated only where usage is equally divided. For foreign names the native pronunciation is given except where the English pronunciation has become thoroughly established, as in "Paris," "Barcelona," "Seine."

In recent years hundreds of foreign geographical names have been changed, either officially or by custom. Both old and new names are given at the appropriate places in the alphabet.

Populations are given in round numbers, except for places in the United States and Canada, where the figures are those of the latest official census. Distances between points are map or air distances, not distances by railroad.

THE EASY REFERENCE FACT-INDEX

Reg. U. S. Pat. Off.



OUR LETTER T started in Egyptian writing as a cross (1). To the Egyptians this picture meant 'mark' or 'brand'. Soon after 2000 B.C., a Semitic people called the Seirites adopted it as an alphabetic sign for the sound of 't', because their word *taw* for 'mark' began with this sound.

Unlike the Egyptians, the Seirites made the sign as an upright cross (2). The later Canaanite-Phoenician alphabet occasionally made the cross slantwise (3). In Hebrew, various forms of this letter were called *tav*, *tau*, and *teth*, and other Semitic languages had similar names.

When the Greeks learned how to write from the Egyptians, they used the upright cross for 't', but omitted the top of the upright stroke (4). The Romans took this sign into Latin, and from Latin it came without change into English.

Our small handwritten 't' is simply the capital letter written quickly with curves (5). This appeared in the handwriting of later Roman times. We use these curves to connect the letter with its neighbors (6). The printed small 't' omits the connecting lines, but keeps the bottom curve.

NOTE.—For the story of how alphabetic writing began and developed, see the articles Alphabet; Writing.

Taal (*tāl*), volcano on Luzon Island, Philippines; crater 7650 ft. wide P-164

Tab'ard Inn C-161

Tabasco (*tā-bās'kō*), Mexico, state in n. of Isthmus of Tehuantepec, on Gulf of Mexico; 9782 sq. mi.; pop. 225,000 Cortez C-372 rainfall M-134

Tabasco pepper, a variety of the genus *Capsicum* P-119

Tabb, John Baunister (1845-1909), poet and Roman Catholic priest, born Amelia County, Va.; taught English, St. Charles' College, Ellicott City, Md. ('An Octave to Mary'; 'Lyrics'; 'Later Lyrics').

Tabby, popular name for a domestic cat, especially a female. Formerly the term was applied more strictly to a striped or mottled cat. Originally it meant a kind of watered silk (from Arabic *'attābī*, a quarter of Baghdad where it was first made, named from Prince 'Attāb).

Tabernacle ("tent"), tentlike portable structure erected by Israelites in wilderness as place of worship; name later applied to the Temple, and hence to other houses of worship, as Mormon Tabernacle at Salt Lake City.

Tabernacles, Feast of, or Succoth (*sūk'ōth*), annual autumn harvest festival of the Jews, commemorating dwelling in tents or booths in the wilderness.

Tabi (*tā'bē*), heavy cotton sock worn in Japan J-188a

Tabira (*tā-bē'rū*), prehistoric ruins in central New Mexico N-99

Tab'itha. See in Index Dorcas

Table, a piece of furniture Chippendale making, picture F-219 colonial A-170, pictures A-169, 171, I-100, 101

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Table manners E-312c-d, 311, pictures E-312b, c

Table Mountain, Union of South Africa C-80, picture S-199

Table setting and serving E-312b-c, picture E-312a

Tabloid newspaper N-107

Taboo. See in Index Tabu

Tab'or, Mount (Jebel Et-Tūr), famous mountain of Palestine, 8 mi. e. of Nazareth; height 1840 ft.

Tabora, Tanganyika Territory, commercial and railroad town in n. center; pop. 25,000; government offices and schools: maps E-139, A-42a

Tabriz (*tā-brēz'*), 2d city of Persia, in extreme n.w.; pop. 220,000; important commercial center; repeatedly devastated by earthquakes; occupied by Turks and then by Russians during 1st World War: P-130, map A-332b

Tabu (*tā-bū'*), or **taboo**, among primitive races, the sacred prohibition of certain acts or the use of certain things M-30, P-5 primitive rules of conduct E-310

Tacaanahac (*tāk'ā-mā-hāk*), Balm-of-Gilead poplar, or balsam poplar P-304

Taché (*tā-shā'*), Alexandre Antonin (1823-94), Canadian Roman Catholic archbishop; worked as missionary among Indians and half-breeds of Northwest for 40 years; founded several colleges, schools, convents; his writings on Northwest of note and value.

Taché (*tā-shā'*), Sir Étienne Pascal (1795-1865), Canadian statesman, born St. Thomas, Quebec; premier of Canada 1856-57, 1864-65; chairman of intercolonial meeting for federation; called Canada's "Sir Roger de Coverley"; knighted 1858.

Tachina (*tāk'ī-nā'*), fly, bristly parasitic fly of family *Tachinidae*; larvae, which are parasitic, especially in caterpillars, are valuable in controlling increase of insect pests.

Tachometer (*tā-kōm'ē-tēr*), device for measuring rates of revolution of machinery

airplane speed-indicator A-76

Tachylite (*tāk'ī-līt*), or **tachylite**, a glassy black variety of basic igneous rock; as basalt or dolerite.

Tacitus (*tās'ī-tūs*), Cornelius (55?-120? A.D.), Roman historian, great Latin stylist, concise and epigrammatic L-69

describes German barbarians G-80, 71

Tack, a small nail N-2

Tack, in sailing, diagram B-165

Tackle, in mechanics M-105

Tackling, in football F-150, picture F-149

Tacna (*tāk'nā*), department and city in s. Peru; pop. department 60,000, city 14,000; in desert region but contains fertile valley growing tobacco, fruits, sugar, cotton; port is Arica in Chile: map S-208b ownership settled P-140-1, P-129

Taco'ma, Wash., 3d city of state, seaport on Puget Sound; pop. 109,408: T-1, map W-29

copper smelting, and commerce W-30

Tacoma, Mount, Indian name for Mount Rainier W-29. See also in Index Rainier, Mount

Taconics, low mountain range on borders of New York and Massachusetts; joins Green Mts. of Vermont with the Hudson Highlands; in Massachusetts called Berkshire Hills: V-286

Tactics, art of maneuvering troops in battle using all branches of military and naval service

airplane A-307

ancient A-307/-308; Fabian policy H-211; Miltiades at Marathon P-135; phalanx A-307f, A-114, T-78, pictures B-7, T-77

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pincers attack: Meuse-Argonne battle (1918) A-282

Tac'tile papillae, of skin S-157

Tad'mor, Biblical name for Palmyra P-40

Tadoussac (*tā-do-sāk'*), village in Quebec, Canada, on St. Lawrence River at mouth of Saguenay River; pop. 644; tourist and health resort; in early period was important trading post and capital of French settlements.

Tadpole, or **polliwog**, the fish-like young of amphibians

frog F-207-9, pictures F-208

salamander S-12, 13

toad T-101

Tael (*tāl*), a Chinese weight of silver used as a unit in keeping accounts and in foreign trade, but repre-

- sented by no actual coin; many different forms of tael; the Haikwan tael has ranged in value from 37 cents to over 75 cents: C-221d
- Taffeta**, a smooth silk fabric of plain, close weave; term applied in the 16th century to a heavy costly dress fabric, later to a thinner silk.
- Taffrail log** L-179, *picture* L-180
- Taffy**, candy C-72
- Taft, Alphonso** (1810-91), father of William Howard T-1
- Taft, Helen Herron** (1861-1943), wife of President Taft W-93
- Taft, Lorado** (1860-1936), American sculptor, writer, and lecturer, born Elmwood, Ill. ('Columbus Memorial Fountain'; 'Solitude of the Soul'; 'Fountain of Time'); and author ('History of American Sculpture'; 'Modern Tendencies in Sculpture') influence on American art S-64
- Taft, Robert A.** (born 1889), American politician, born Cincinnati, Ohio, son of William Howard Taft; in Ohio legislature 1921-26, 1931-32; U.S. senator after 1939.
- Taft, William Howard** (1857-1930), 26th president of U. S. T-1-4 administration (1909-13) T-2-3, U-247
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- Arizona and New Mexico admitted A-292, N-99
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- wife and family W-93
- "Tag," or "Japanese statue," game P-254, *picture* P-254
- "Tag, Schlag," Swedish game P-254, *picture* P-254
- Tagalogs** (*tā-gū'logz*), a brown people of the Philippines, inhabiting chiefly central Luzon; they are Christians and lead the other races in intelligence and culture; language, called Tagalog, highly developed and the national language of the Philippines.
- Tagetes** (*tā-jē'tēs*), the marigold genus of plants M-84
- Taggard, Genevieve** (born 1894), American poet, born Waltsburg, Wash.; spent girlhood in Hawaii; taught English at Mt. Holyoke, Bennington, and Sarah Lawrence colleges ('For Bager Lovers'; 'Travelling Standing Still'; poetry, 'The Life and Mind of Emily Dickinson', biography).
- Taggart, Walter Thomas** (1872-1938), chemist, born Philadelphia, Pa.; director of department of chemistry and chemical engineering, University of Pennsylvania, 1920-27; in 1st World War, was chemical expert in ordnance department.
- Tagliacozzo** (*tāi-yū-kōt'sō*), Italy, small town 45 mi. n.e. of Rome; Charles of Anjou defeated Conradin, the last Hohenstaufen 1268.
- Taglioni** (*tā-lyō'nā*), Maria (1804-84), ballet dancer, born Stockholm, Sweden; daughter of an Italian ballet master; first appearance in Vienna 1822, in Paris 1827; invented new ballet steps; beautiful, otherworldly style.
- Tagore** (*tā-gō'r*), Sir Rabindranath (1861-1941), Hindu poet, philosopher, social reformer, and educator; works include drama, poetry, children's stories, books on travel, politics, and religion; established university (called Visva-Bharati) at Bolpur 1901; lectured in Europe, Japan, and the U. S.: I-42
- place in English literature E-289
- Tagua** (*tā'gū'ā*), the vegetable ivory palm I-176
- Tagua nut, corozo nut, or vegetable ivory** I-176, N-188
- used for buttons B-287-8, N-188
- Tagus**, largest river in Spanish peninsula, 550 mi. long; flows across Spain, emptying into Atlantic at Lisbon, Portugal; *map* E-328d
- Lisbon on L-156
- Toledo on S-226
- Tahiti** (*tā-hē'tē*), largest of Society Islands in S. Pacific; about 600 sq. mi.; pop. 19,000; chief town Papeete; exports mother-of-pearl, vanilla, phosphates; *map* P-10c
- native girl, *picture* P-5
- Tahoe** (*tā'hō*), Lake, largest lake in Sierra Nevada; on boundary between California and Nevada; 20 mi. by 10: S-141, *map* N-77
- Tai, or Thai** (*tā*), large group of tribes in S. China and Indo-China speaking Siamese-Chinese languages.
- Tai-dong, or Ta-Tong River**, Korea, flows from north into Korea Bay; navigable for 75 mi. to Heijo.
- Taiheku** (*tā-hē'kū*), cap. of Formosa; pop. 275,000; camphor refining and tobacco manufacturing; *map* J-186
- Taihyu** (*tā'hyū*), Korea, city 60 mi. n. of Fusan; pop. 110,000; *map* A-332b
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- squirrel, *picture* N-37
- tadpole F-207
- whale, fluked W-77, 80, *picture* W-77
- Tailings**, in flour milling F-119
- Taille** (*tāl* or *tā'yū*), old tax in France E-304
- Tailleur** (*tā-yū-fēr*), troubadour and soldier, of the 11th century; first famous singer of the 'Song of Roland'; at the battle of Hastings, led the attack and was killed.
- Tailless cat** (Manx) C-96
- Tailor bird** T-4
- Tailor's muscle, or sartorius, of the thigh**, *picture* M-305
- Tainan** (*tā'nān*), city in S. Formosa; pop. 100,000; cap. until 1896; *map* J-186
- Táin Bó Ónallgnae**, Irish epic I-132
- Taine** (*tēn*), Hippolyte Adolphe (1828-93), French literary and art critic, philosopher, and historian; analyzed art and literature scientifically as products of race and environment ('History of English Literature'; 'Origins of Contemporary France')
- place in French literature F-197
- Tai'ping** (*tā-ping*) Rebellion, in China (1850-64) C-221k
- Gordon ends G-121
- Hangchow destroyed H-210
- Nanking, destruction at N-3
- T'ai-Shan (*tā'shān*), sacred mountain in Shantung, about 5000 ft. high; near village where Confucius was born; pilgrim center.
- Taiwan** (*tā-wān*). See in Index Formosa
- Tajikistan** (*tā-zhēk-i-stān*), or **Tajik**, Soviet Socialist Republic, in cent. Asia; area 55,598 sq. mi.; pop. 1,485,000; cap. Stalinabad: T-158, R-179
- Taj Mahal** (*tāj mā-hāl*) ("gem of buildings"), beautiful tomb near Delhi, India T-4-6, *picture* T-5
- Takla Makan**, desert in Sinkiang province of w. China; about 260,000 sq. mi.: A-328, *map* A-332b
- Taku** (*tā-kū*), China, strongly fortified seaport guarding approach to Tientsin and Peking; captured by British and French fleets (1860) and by allied troops (1900) during Boxer uprising; *map* C-212
- Talara** (*tā-lā-rā*), in n.w. Peru, 40 mi. n. of Talca; pop. 7500
- oil storage tanks; *map* S-208b, *picture* S-207
- Talavera de la Reina** (*tā-lā-vā-rā dā tā-rā-ē-nā*) (Roman Caesobriga), town of central Spain on River Tagus; pop. 14,000; victory of Wellington over French under Joseph Bonaparte, 1809.
- Talbot, Thomas** (1771-1853), Canadian colonist, born County Dublin, Ireland; about 1802 founded Talbot settlement at Port Talbot on Lake Erie in Upper Canada; ruled in patriarchal manner almost 50 years and left estate to his servants.
- Tale, magnesium silicate** T-6
- relative hardness M-181
- varieties M-184, T-6
- Talca** (*tāl'kā*), Chile, cap. of province of Talca on Rio Claro, 170 mi. s. of Valparaiso; pop. 45,000; matches, flour, shoes, furniture, paper, leather; *map* C-206
- Talcahuano** (*tāl-kā-wā'nō*), Chile, seaport and naval station on Bay of Concepción, 8 mi. n.w. of Concepción; pop. 28,000; wheat exporting point: C-207c, *map* C-206
- Tal'cum powder** T-6, M-184
- Talent**, an ancient weight and denomination of money; Attic talent equal to about \$1200; great Roman talent about \$500, small Roman about \$375; Hebrew, Assyrian, and Babylonian from \$1550 to \$2000.
- 'Tale of a Tub'**, satire by Jonathan Swift (1704) directed mainly against hypocrisy in religion; greatly harmed Swift's chances for high advancement in the church.
- 'Tale of Two Cities'**, novel of the French Revolution by Charles Dickens (1859); the two cities involved are Paris and London: D-66
- 'Tales from Shakespeare'** by Charles and Mary Lamb L-56, L-161, S-100g
- 'Tales of a Wayside Inn'**, collection of narrative poems by H. W. Longfellow founded largely on folk stories and legends and on events in American history; each narrative written as though told by a different person.
- 'Tales of Hoffmann'**, opera by Offenbach, story O-233
- Talfourd** (*tāl'fōrd*), Sir Thomas Noon

Key—cāpe, āt, fār, fāst, whāt, fāl; mē, yēt, fēr, there; tē, bīt; rōw, wōn, fōr, nōt, dā; cūre, bāt, ryde, fyll, bār; n;

(1795-1854), English lawyer and author, to whom Dickens dedicated 'Pickwick Papers' in recognition of his labors for a copyright law; defended Moxon against charge of blasphemy for publishing Shelley's 'Queen Mab'; edited Lamb's letters and wrote 'Ion', tragedy played with great success by Macready.

Tallenwan (*tā-lē-ēn-wān'*), bay on e. coast of Liaotung Peninsula, Manchuria; leased to Russia by China 1898; surrendered to Japan 1905.

Talliesin (*tāl-ē-ēs'in*), name of Frank Lloyd Wright's residence near Spring Green, Wis., *picture* A-272b

Tallmu Ho, *See in Index* Tarim River

Tallisman M-30, 32

'Tallman, The', novel by Scott S-12

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Talking machine P-174-6. *See also in Index* Phonograph

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photoelectric cell P-179, *picture* P-177

Talladega, Ala., city in agricultural and dairying region, 40 mi. e. of Birmingham; pop. 9298; Talladega College (for Negroes), State Institute for Deaf, Dumb, and Blind; General Jackson defeated band of Creek Indians 1813; *map* A-98

Talladega College, at Talladega, Ala.; founded 1867; arts and sciences.

Tallahassee, Fla., cap. of state, 158 mi. w. of Jacksonville; pop. 16,240; cotton, tobacco, lumber, naval stores; dairying, farming, and stock-raising district; State College for Women, Florida Agricultural and Mechanical College; F-116, *maps* F-111, 112

Tallapoosa, battle of (1814), between Creek Indians and Americans under Andrew Jackson; occurred at Horseshoe Bend of the Tallapoosa River, Ala.; also known as battle of Horseshoe Bend; J-178

Tallapoosa River, flows into the Alabama; 250 mi. long; *map* A-98

Talleyrand-Périgord (*tā-lē-rān' pā-rē-gōr'*, English *tāl'i-rān'd*), Prince Charles Maurice de (1754-1838), French statesman T-6-7

'X Y Z' Affair X-202

Tallien (*tā-lē-yāh'*), Jean Lambert (1767-1820), French Revolutionist, leading Terrorist; he was chiefly responsible for fall and execution of Robespierre.

Tallinn (*tāl-in'*), German Royal, chief seaport of Soviet Republic of Esthonia, on Gulf of Finland; pop. 145,000; Hanse town; E-306, *map* E-326c

Tallmadge, James, Jr. (1778-1853), American lawyer and leading Whig protectionist, born Stanfordville, N. Y.; congressman, 1817-19; lieutenant-governor, New York 1825-26; president, New York University 1830-46

Missouri Compromise M-210

Tallow, the melted fat of sheep or cattle P-19

candles L-58

oleomargarine O-221-3

Tallow tree, tree of China, India, and other warm countries belonging to the spurge family and having seeds covered with greasy white substance used in making candles, soap, etc.; also butter or tallow tree of West Africa yielding yellow greasy juice.

Talma (*tāl-mā'*), François Joseph (1763-1826), French tragedian; in-

roduced practice of dressing in costume appropriate to time and country of play.

Talmage (*tāl'māg*), Thomas DeWitt (1832-1902), American clergyman and pulpit orator, born Bound Brook, N. J.; pastor of Brooklyn Tabernacle 1870-94; editor of *Christian Herald* after 1890; his sermons were published each week in hundreds of religious and secular papers.

Talmud, great collection of Jewish laws and commentaries H-267 readings at Passover P-85

Talon (*tā-lōh'*), Jean Baptiste (1625-91), one of the ablest of the French officials who governed New France; as intendant of justice and finance (1663-68, 1670-72) he encouraged trade and exploration of the West.

Talus, heap of loose rock which accumulates at the foot of a cliff or mountain; weathering causes its formation.

Talwar, a sword, *picture* S-358

Taman'dua, the lesser ant-eater, *picture* A-218

Tamanend, or Tammany (died about 1740), Delaware Indian chief, famed for judgment, fairness and qualities of leadership

Tammany Society named for T-7

Tamaqua, Pa., borough on Little Schuylkill River, 32 mi. n. of Reading; pop. 12,486; coal-mining; powder plant, underwear factory.

Tam'arack, or haekmutack, the American larch L-65, *picture* L-64 not an evergreen E-340

Tam'arind, a pod-bearing tropical tree T-7

Tamarisk family, or Tamaricaceae (*tām-ā-ri-kā'sē-ē*), a family of shrubs and trees including the tamarisk, false tamarisk, and juniper tamarisk.

Tamatave (*tā-mā-tū'vā*), Madagascar; pop. 21,000; meat-preserving plant; railroad to Tananarive commerce M-18

Tamaulipas (*tā-mā-g-lē'pās*), Mexico, state in n.e. on Gulf of Mexico; 30,731 sq. mi.; pop. 345,000; cap. Ciudad Victoria.

Tambourine (*tām-bu-rēn'*), musical instrument D-114, *picture* M-322

Tambov (*tām-bōf'*), Russia, grain center in rich farm region, 265 mi. s.e. of Moscow; pop. 120,000; seat of university; founded 1636 as fortress to keep out Tatars; *map* E-326e

Tamerlane. *See in Index* Timur Leng

Tam'als, a people of s. India and Ceylon I-34

Malay Peninsula M-42

'Taming of the Shrew', one of the most popular of Shakespeare's comedies; Petruchio, the hero, tames Katharine, his shrewish wife

chronology and rank S-100e

Tamajurt, Morocco, 3d highest peak in Atlas Mts., 50 mi. s. w. of city of Morocco; altitude, 14,500 ft.

Tam'many, political organization of New York City T-7

Tweed ring N-134

Wilson's nomination opposed by W-106

Tammerfors (*tā-mēr-fōrs'*). *See in Index* Tampere

Tammuz (*tām'mōz*), the Babylonian Adonis, for whom women worshippers wept yearly (Ezek. viii, 14).

Tam O'Shanter, in Burns's poem of that name, a drunken, good-natured farmer who, returning from a night of revelry, surprises a dance of witches and is pursued by them.

Tampa, Fla., commercial city, port, and winter resort; pop. 108,391; T-7-8, *maps* F-111, 112

Tampa Bay, Fla., harbor 35 mi. long, an inlet of the Gulf of Mexico, *map* F-112

De Soto christens D-55-6

Tampere (*tām'pē-rā*), Swedish **Tam-morfors**, Finland, city 100 mi. n.w. of Helsinki; pop. 60,000; water power from nearby falls; cotton, paper, sawmills, and iron mills; locomotive works and shipyards; *map* E-326e

Tampico (*tām-pē'kō*), Mexico, seaport on Pánuco River near Gulf of Mexico; pop. 68,000; marshy, unhealthy small port until discovery of rich oil fields in early 20th century; now flourishing city with improved harbor and drained lands; exports petroleum, silver, copper, fiber, and farm products: M-141, 142e, *map* M-133, *picture* M-141

Tampico incident M-141

Tampico fiber. *See in Index* Istle

Tamworth, England, old town on borders of Staffordshire and Warwickshire, on River Tame; interesting antiquities; pop. 8000.

Tamworth, breed of hogs H-316

Tana (*tā'nd*), a river of Kenya Colony, East Africa, rising on Mount Kenya; 500 mi. s.e. to Indian Ocean; *map* E-139

Tana, Lake, in Ethiopia at source of Blue Nile E-308, *maps* E-308, A-242

Tan'ager, a bird of the *Thraupidae* family T-8

scarlet tanager T-8, *color plate* E-140; change of plumage E-130

western tanager T-8

Tanagra (*tām'ā-grā*), Greece, ancient town of Boeotia; 457 B.C. Spartans defeated Athenians; famous necropolis with terra cotta statuettes figurines P-330

Tanaka, Gilehl, Baron (1863-1929), Japanese statesman and general; son of servant; graduated from military school and rose high in army; minister of war in three cabinets; leader of Selyukwai party, 1926; premier, 1927; bold policy; made many enemies.

Tananarive (*tā-nū-nū-rēv'*), also **An-tananarivo**, cap. and largest city of Madagascar; pop. 125,000; M-13, *map* A-42a

Tanana River (*tā-nā-nū'*), Alaska, large stream flowing n.w. into Yukon River; navigable in summer for about 200 mi.; *map* A-105

homesteads in valley A-104

Tancred (*tām'krēd*) (died 1112), Norman-Sicilian hero of the First Crusade, subsequently prince of Antioch; nephew of Robert Guiscard, cousin and companion-in-arms of Bohemond; hero of Tasso's 'Jerusalem Delivered'.

Tandem plane A-69, *picture* A-66

Taney (*tā'ni*), Roger Brooke (1777-1864), American jurist born Calvert County, Md.; chief justice U. S. Supreme Court 1836-64; T-8

Andrew Jackson and J-180

Dred Scott decision D-103

Taneycome, Lake, in Missouri O-266

T'ang (*tāng*), celebrated Chinese dynasty (618-907); period of expansion and great political power; extensive trade with lands to west; arts flourished; finest Chinese poetry written at this time: C-221/ pottery, *pictures* F-41, P-333

Tang, a fish of the genus *Teuthis*, with a knifelike movable spine on each side of tail; also known as surgeon-fish, lancet, or doctorfish.

Tan'ga, seaport and railway terminus in Tanganyika Territory, East Africa; estimated pop. 13,000; *maps* E-139, A-42a

Tanganyika (*tân-gân-yê-kâ*), Lake, in e. cent. Africa; one of longest fresh-water lakes in the world: T-8, *maps* A-42a, C-331

Livingstone at L-169

Tanganyika Territory, British mandate in East Africa (before 1913, German East Africa); 360,000 sq. mi. (including 20,000 sq. mi. of inland waters); pop. 5,000,000, chiefly Bantus; exports sisal; cap. Dar-es-Salaam: E-139, *maps* E-139, A-42a

importance to British B-247

trade route to the sea M-294

Victoria Nyanza borders V-297

Tan'gent

problem in geometry G-51

trigonometry T-139

Tan'gerine, or mandarin orange O-240

Tangier (*tân-gêr'*), Morocco, former international zone annexed by Spain 1840; 225 sq. mi.; pop. about 80,000; cap. Tangier: T-8-9, M-260, *maps* A-127, A-42a-b

Tangier, Morocco, cap. of Tangier zone; one of chief seaports of Morocco, on Strait of Gibraltar; pop. about 45,000; T-8-9, *maps* A-127, A-42a-b

street scene, *picture* M-260

Tanjore (*tân-jôr'*), British India, literary and religious center in Madras Presidency, 175 mi. s.w. of Madras; pop. 67,000; capital of ancient Hindu dynasty of Cholas; rugs, silks, jewelry; surrounded by rich district of Tanjore, (3727 sq. mi.; pop. 2,385,000)

pagoda, *picture* I-39

Tank, or gasometer, in gas works G-22

Tanka, Japanese poetry J-191

Tank cars: milk M-1, *picture* M-3; petroleum P-151

Tank destroyer T-9

Tanks, armored motor vehicles T-9, A-307b, A-388, *pictures* A-307o, W-155

assembly line, *picture* U-251b

1st World War T-9, W-156, 101

origin of name T-9

2d World War T-9

Tank ships S-128, P-151, *picture* P-153

Tank trap T-9

Tan'nenberg, village in East Prussia, 85 mi. s. of Königsberg; center of German line in 1st World War battle by which Hindenburg stopped Russian invasion: W-155, *map* W-156

Tanner, Henry Ossawa (1859-1937), American Negro painter, born Pittsburgh; lived in Paris many years ('Raising of Lazarus').

Tannhäuser (*tân'hoi-sêr*), knight in German legend T-9

opera W-1, T-9: story O-233

Tannin, or tannic acid, organic chemical compound used in tanning L-38-4

brick clay treated with C-260

ink I-79

sources L-33-4; chestnut bark C-184; eucalyptus E-314; oak bark and galls O-190; pomegranate root P-299; sumach S-325

tea contains T-22, 26

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chemical: chrome L-84; alum A-137

Egyptian E-199

gloves G-107, L-84

hair removed from hides L-83, A-128

Tannu-Tuva (Tuviniian People's Republic), semi-independent state n.w. of Mongolia; 64,000 sq. mi.; pop. 65,000; M-222b, d, *maps* M-222c, A-332b

Tanoak, or tanbark oak, evergreen tree (*Lithocarpus densiflora*) of beech

family, native to the coastal region of Oregon and California, the only American member of a large genus native to Asia. Grows 60 ft. to 80 ft., rarely 150 ft.; crown narrow, round-topped. Leaves thick, oblong, to 5 in. long with toothed margins. Acorn is set in a hairy cup. Bark used in tanning leather.

Tano'an, a linguistic stock of Indians, consisting of the Tewa, Tigua, and Jemez groups; live in pueblos on Rio Grande and tributaries in N. M.

Tansy, tall herb of the aster family with bitter aromatic flavor; used for garnishing and flavoring.

Tan'ta, Egypt, railroad town 60 mi. n. of Cairo; pop. 95,000; noted for fairs and Moslem festivals held every 3 years.

Tantalite (*tân'tâ-lit*), a sub-metallic iron-black ore, ferrous tantalate, yielding the metal tantalum T-9

Tantalum (*tân'tâ-lîm*), metallic element T-9, C-176, *table* C-168

Tan'talus, in Greek myth, son of Zeus, father of Niobe and Pelops T-9

Taoism (*dou'ism*, or *tau'ism*), a religion of China R-71-2, C-221e

Taormina (*tâ-ôr-mê-nâ*), Sicily, winter resort on e. coast S-140

ancient ruins, *picture* S-139

Taos (*tâ'ôs*), N. M., village 50 mi. n.e. of Santa Fe; Indian pueblos; artists' colony; pop. 965; *map* N-97

Taos, Rancho de, N. M., mission, *picture* S-222

Taos Indians, Pueblo tribe in New Mexico P-365

Tao To King (*tau tē kōng*) ('Book of the Way and Virtue'), the sacred book of Taoism by Lao-Tse.

Tapa (*tâ'pâ*) cloth, fabric made from paper mulberry M-298, H-244, *picture* C-275

Tapadera (*tâ-pâ-dâ'râ*), stirrup protector C-113

Tapajós or **Tapajós** (*tâ-pâ-zhō's*), a river of Brazil, flows n. 1040 mi. to join Amazon; navigable about 200 mi. above its mouth: *maps* B-228, S-208b

Ford rubber plantation B-227, *picture* B-226c

Tape-grass, or oel-grass, a water plant or hydrophyte W-48

Tap'etry T-9-11

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Bayeux N-149, T-10, T-66

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Renaissance T-65

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Tapestry brick B-238

Tapeworm, a parasitic flatworm W-180a-b

Tapioea (*tâp-i-ô'kâ*) T-10

Tap'ir, animal related to rhinoceros and horse T-10-12, *picture* T-12

Tapiro (*tâ-pê'rô*), natives of New Guinea P-218

Tappan, Eva March (1854-1930), American author, born Blackstone, Mass.; wrote books of information, biography, history, and science for young folks ('American Hero Stories'; 'When Knights Were Bold'; 'Our European Ancestors').

Tap'pan Sea, N. Y., expansion of Hudson River, 12 mi. long, 8½ mi. wide, Tarrytown and Ossining on its shores

historic interest H-350

Tapping machine, a tool, T-112

Tap-root R-153

Taps, the military signal for retiring, played at night in camp on bugle or drum

bugle score in U. S. Army B-262

Tar, dark oily liquid resulting from destructive distillation of wood, coal, or other organic matter; name is often applied to denser substance, pitch: T-12. *See also in Index* Coal-tar products

coal-tar C-288-9

liquid behavior when seemingly solid P-190

rope, tarred R-155

United States production: Florida F-112; Georgia G-56; Mississippi M-202; North Carolina N-157

Tarabulus, Syria. *See* Tripoli

Tarahumare (*tâ-râ-q-nâ'râ*), an Indian tribe of Piman stock living in the Sierra Madre in s. Chihuahua and Sonora, Mexico; some of them were cliff-dwellers.

Tarakan Island, off n.e. coast of Dutch Borneo; 117 sq. mi.: *map* E-142

petroleum B-197, *picture* E-142e

Tarantella, in music, a very fast and emotional Italian dance in 6-8 time T-12

Tar'antism S-257

Taranto (*tâ-rân-lô*) (ancient Tarentum), seaport of s. Italy on Gulf of Taranto; pop. 140,000; large arsenal; oysters; textile manufactures: *map* I-156

Taranto, Gulf of, Italy, *map* I-156

Tarantula, any of several large hairy spiders T-12, S-257

killed by wasp W-34

Tarantula-killer, a wasp W-34

Tarapacá (*tâ-râ-pâ-kâ'*), maritime province of n. Chile C-208, P-140

Tarascon (*tâ-râs-kôn'*), historic town of s.e. France on Rhone River; pop. 5000; Roman ruins and medieval church and castle.

Tarascos (*tâ-râs'hô's*), or Tarascans, an Indian tribe of s. Mexico, chiefly in the state of Michoacan; formerly a powerful nation, considerably advanced in civilization at time of Spanish conquest.

Tarawa, one of Gilbert Islands, *map* P-10b

battle, 2d World War W-179

Tar-barrel cart T-122

Tarbell, Edmund C. (1862-1938), painter, born West Groton, Mass.; at first concerned with various phases of illumination ('The Venetian Blind'); later painted in a more quiet and somber key ('Girl Crocheting'); also skilled as portrait painter ('Woodrow Wilson', 'Marshal Foch', 'Herbert Hoover').

Tarbell, Ida M. (1857-1944), American author and magazine editor; best known works are biographies (including several books on Lincoln) and 'History of the Standard Oil Company'; 'All in the Day's Work', autobiography.

Tarbes (*târb*), town of s.w. France; 75 mi. s.w. of Toulouse; pop. 35,000; horse breeding; English under Wellington defeated French 1814.

Tarde (*târd*), Gabriel de (1843-1904), French sociologist; developed theory that the many are imitators of the few.

Tardieu (*târd-yû'*), André (born 1876), French statesman; high commissioner to U. S. 1917-19; plenipotentiary at Peace Conference 1919-20; premier 1929-30, and again in 1932.

Tare, a name applied to the common vetch (*Vicia sativa*), a plant used

as a cover-crop in s. U.S. and as forage in Europe. Tares of the Bible may have been the rye grass called darnel (*Lolium temulentum*).
Tarentum (*tā-rēm'tūm*), chief ancient Greek city in s. Italy; modern Taranto
 war with Rome P-374
Target, for archery A-255
Targums, paraphrases of the Old Testament in Aramaic, the language that replaced Hebrew as everyday language of the Jews; designed for Jews who could no longer read and understand Hebrew.
Tar-Heel State, name sometimes applied to North Carolina N-157
Tarifa (*tā-rē'fā*), Spain, seaport on Strait of Gibraltar, southernmost town on mainland of Europe; pop. 12,000; anchovy and tunny fisheries; old Moorish walls.
Tariff T-13-14. *See also in Index*
 Reciprocity
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 Payne-Aldrich, under Taft, 1909 T-2; lowered under Wilson, 1913 T-14
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 Tariff Commission established, 1916 T-13b
 Fordney-McCumber, Harding's administration, 1922 H-219
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Tariff commission, United States T-13b, U-231
Tarik (*Tariq bin Zaid*) (died 720? A.D.), Mohammedan chief, leader of first Moslem invasion of Spain G-86
Tarim (*tā-rēm'*), also **Tailmu Ho**, chief river of Chinese Turkestan; flows e. about 1000 mi. into group of lakes and marshes known as Lob Nor: A-328, map C-211
Tarlington, Booth (born 1869), American novelist, born Indianap-

olis; educated at Purdue and Princeton; served a term in Indiana legislature; first won success with 'The Gentleman from Indiana' and 'Monsieur Beaucaire'; showed keen understanding of boy psychology in 'Penrod' and 'Seventeen'; dealt with more mature characters in 'The Magnificent Ambersons', 'Alice Adams', 'Mary's Neck'; awarded Pulitzer prize 1919 and 1922: *picture* A-182
Tarkio College, at Tarkio, Mo.; United Presbyterian; founded 1883; arts and science, normal school, music, commerce.
Tarlatan, thin, heavily sized cotton fabric of open weave.
Tarleton, Sir Banastre (1754-1833), English soldier; served in American Revolution under Cornwallis in southern campaigns; defeated by Gen. Daniel Morgan at Cowpens, S.C., in 1781; made general 1812.
Tarnish, on silver S-323
Tarnopol (*tār-nō'pōl*), Polish city 75 mi. s.e. of Lwow; pop. 31,000; flour mills, distilleries, breweries; formerly in Austria; suffered from Russian occupation in 1st World War; incorporated into Russia 1939.
Tarnow (*tār-nōf*), Poland, city 45 mi. e. of Cracow; pop. 36,000; farm implements, glass, chicory; captured by Germans 1939.
Taro (*tā'rō*), a perennial plant (*Colocasia esculenta*) of the arum family with large fleshy underground tubers that are valued as food in many of the Pacific islands; a variety known as dasheen is grown in s. U. S.: H-241, *picture* F-6
Tarpeian Rock, cliff of Capitoline Hill, Rome, from which condemned criminals were thrown; named for burial place of Tarpela, daughter of Tarpeius, Roman governor in time of Romulus; she betrayed Rome to the Sabines by opening the city gates to them; as a reward she demanded that they give her what they wore on their left arms, namely their bracelets, but the Sabines crushed her with the shields which they also wore on their left arms.
Tarpon, a large herring-like fish, called silver king T-14, F-75
Tarpon Springs, Fla., town and port on w. coast of Florida 22 mi. n.w. of Tampa; pop. 8402; *map* F-112
 sponge fisheries F-112, *picture* S-261
Tarquinii (*tār-quin'i-i*), an ancient Etruscan city 45 mi. n.w. of Rome; site near modern Corneto Tarquinia, marked by many remains, especially tombs
 war with Rome R-130
Tarquin'us Priscus, 5th legendary king of Rome R-129
Tarquinus Superbus ("The Proud"), 7th and last legendary king of Rome R-129-30
 buys Sibylline books S-139
Tarragon, a variety of sage S-4, S-251
Tarragona (*tār-rā-gō'nā*), Spain, picturesque seaport town on Mediterranean at mouth of River Francoli about 50 mi. s.w. of Barcelona; pop. 31,000; exports wine, oil; ancient Tarraco, captured by Romans 218 B.C. in Second Punic War; *map* S-226
Tar River, N. C., rises in n. center, flows s.e. 220 mi., entering Pamlico Sound by Pamlico River; *map* N-156
Tarrytown, N. Y., village on Hudson River, 25 mi. n. of New York City; pop. 6874; nursery stock, pottery; home of Washington Irving.

Tarsal bone, any of several bones forming the ankle S-156, *picture* S-156
Tar'shish, ancient country mentioned in Bible (probably Spain).
Tarsus (*tār'sūs*), Turkey, town in s. Asia Minor 20 mi. w. of Adana; pop. 25,000; in ancient times a splendid city, cap. of Cilicia; birthplace of St. Paul (Acts xxii, 3): *map* E-320e
Tarsus, the ankle F-146, 148
 elongated in birds B-120-1
Tartan, checkered cloth also called plaid. *See in Index* Plaid
Tartar, partly purified wine crust (argol) T-14
Tartar, cream of, acid potassium tartrate T-14
Tartar emetic, a salt of tartaric acid T-14, A-222
Tartare (*tār'tēr*) sauce, mayonnaise with finely chopped pickles, parsley, onions, olives, capers.
Tartaric acid, a mild acid made from grapes T-14
 crystals, *picture* C-409
Tartarin (*tār-tā-rān'*), the boastful Quixotic hero of Daudet's humorous masterpieces, 'Tartarin of Tarascon', 'Tartarin on the Alps', and 'Port-Tarascon'.
Tartars. *See in Index* Tatars
Tartarus, in Greek mythology, place of punishment H-194
 Titans imprisoned in U-261
Tartary, old name for central Asia T-16
Tartini (*tār-tē'nē*), Giuseppe (1692-1770), Italian violinist and composer; discovered what is known as "Tartini's tone" or combinational tone, produced by two tones sounding together ('The Devil's Trill').
Tartu, German Dorpat, town in e. Estonia, 168 mi. s.w. of Leningrad; pop. 60,000; famous for university founded by Gustavus Adolphus (1632); town founded 1080, important in Hanseatic League: *map* E-326e
'Tartuffe' (*tār-tūf'*), comedy by Molière (1664); the main character, Tartuffe, a pious adventurer, is the most famous hypocrite in literature.
Taschereau (*tāsh-rō*), Elzéar Alexandre (1820-98), first Canadian cardinal, archbishop of Quebec.
Tashkent, or Tashkend, cap. and largest city of Uzbekistan; pop. 535,000; former cap. of Russian Turkestan: T-158, *map* A-332b
Task force, United States Army and Navy A-306
Tasman (*tās'mān*), Abel Jansen (1603?-59), greatest of Dutch navigators, born at Lutjegast near Groningen; went to sea as a boy; made two important expeditions (1642-43 and 1644); accused of wanton cruelty after a looting foray in Philippines; died in Batavia
 discoveries P-7: Fiji Islands F-33; New Zealand N-136; Tasmania A-372
Tasmania, an island state of the Australian Commonwealth; 26,215 sq. mi.; pop. 230,000; cap. Hobart: T-14-15, *maps* A-872a, b
 duckbill D-118-19
 kangaroo K-1
 zebra wolf T-15
Tasmanian devil, a marsupial T-15, *picture* T-14
 scientific name K-2
Tasmanian perch, *picture* F-87
Tasmanian wolf, zebra wolf, or thylacine, a striped carnivorous marsupial of Australasia T-15
 scientific name K-2

Tasman Sea, part of Pacific Ocean between Australia and New Zealand, *map* A-372a

Tas'so, Torquato (1544-95), Italian poet T-15-16, *picture* I-154 'Jerusalem Delivered' I-154

Taste, sense of T-16, T-107 confused with smell S-164 sensation and perception S-76

Tatar City, in Peking, China P-101, 102

Tatar Republic, an autonomous republic of Russian Soviet Federative Socialist Republic, w. of Bashkir Republic; about 26,000 sq. mi.; pop. 2,920,000; cap. Kazan.

Tatars (*tä'tärs*) (sometimes called Tartars), group of central Asiatic tribes T-16. *See also* Mongols Great Wall of China obstructed C-221b, *map* C-211, *picture* C-209 Russia overrun R-183, R-196

Tate (*tät*), Nahum (1652-1715), English poet and playwright; born Dublin; poet laureate (1692-1715); chiefly known for mangled versions of plays of Shakespeare, and for version of the Psalms in which he collaborated with Nicholas Brady.

Tate Gallery, London L-189, T-165, *table* M-892

'Tatler, The', periodical published by Sir Richard Steele E-285, A-18

Ta-Tong River, Korea. *See in Index* Tai-dong

Tatori (*tä'törä*), name of Japanese shock troops in 2d World War.

Tatra (*tä'trä*) Mountains, also Tatry, central and loftiest group of Carpathians, on Poland-Slovakia border; highest point 8737 ft.

Tat'sing Dynasty, or Manchu Dynasty. *See in Index* Manchu Dynasty

Tattoo'ing T-16

Taubert (*tou'bert*), Karl Gottfried Wilhelm (1811-91), German pianist, conductor, and composer; conductor at Berlin; wrote operas, symphonies, choral and instrumental works.

Tauchnitz (*toux'nits*), Christian B. (1816-95), German publisher; in 1841 he began publication of a collection of British and American authors, known everywhere as the "Tauchnitz edition."

Tauler (*tou'tär*), Johann (1300?-61), German mystic R-65

Taunton, England, town of Somersetshire 38 mi. s.w. of Bristol; pop. 23,000; here Monmouth assumed title of king, and here Jeffrey held bloody assizes; taken by Robert Blake and the Parliamentarians in civil wars 1644-45; *map* E-270a

Taunton, Mass., manufacturing and railroad city 32 mi. s. of Boston on Taunton River; pop. 37,395; aluminum, brass, and copper goods, textiles, machinery, hardware flag of 1774 F-98, *color plate* F-90

Tannus (*tou'nys*), mountain range in Prussia, Germany, lying between the Rhine and the Main; average elevation 1500 ft.; famous for its picturesque castles and mineral springs. Lorelei Rock on the Rhine is an abutment of the range.

Taupo (*tä'pö*), Lake, largest lake of North Island, New Zealand, 22 miles long.

Taurus (*tä'rüs*), or Bull, a constellation in the zodiac Z-218, *charts* S-275, 275f, h. Aldebaran in S-275b, *charts* S-275f, h. Pleiades in F-259, *charts* S-275f, h.

Taurus Mountains, series of ranges in Asia Minor, extending w. from Euphrates; highest peaks over 10,000 ft.; n.e. extension sometimes called Anti-Taurus.

Tausen (*tou'sen*), Hans (1494-1561), Danish reformer; follower of Luther, and leader in Danish reformation.

Taussig (*tous'sig*), Frank William (1859-1940), American economist, born St. Louis, Mo.; professor economics Harvard 1882-1935; chairman U. S. Tariff Commission 1917-19; editor, *Quarterly Journal of Economics* 1896-1937 ('Tariff History of United States'; 'Principles of Economics'; 'International Trade').

Tautog (*tä-tög*), a food-fish common on the American coast. Its deep, blunt body is dusky mottled; capable of crushing hard shells of crabs and shellfish with its powerful jaws.

Taxacene (*täks-ä'sä-sä*). *See in Index* Yew family

Taxation T-16-18

American colonies R-32-3, 84 bachelors taxed A-167 resistance to taxes: Boston Tea Party R-83; Virginia V-308; North Carolina N-159; Maryland M-78, *picture* R-86; New Jersey N-92

Stamp Act S-269-70. *See also in Index* Stamp Act

assessment of T-18

business taxes and excises T-17 China C-221b

Colbert quoted T-17

Congress, Continental, powers A-318, U-236, R-87

county C-382, T-17

direct and indirect T-16-17

Egypt: ancient E-208; modern E-198

excise taxes T-17

federal T-16, 17, 18; Treasury Department collects U-223

France, at time of Revolution F-200-1, 202

Great Britain: history P-77-8; Edward I E-188; income tax I-27; land tax L-173-4, T-18; Lloyd George reforms tax E-275, L-173-4; poll tax T-171

income tax I-27. *See also in Index* Income tax

inheritance tax T-17; Florida prohibits F-114

Middle Ages R-76, F-27, 29, 30

poll tax T-17; England T-171

property tax T-17-18; North Carolina eliminates N-160

Rome, ancient R-134

single tax T-18; Calgary, Alberta C-24

social security T-17

state T-17-18, A-392

tariff T-13-14. *See also in Index* Tariff

U. S. Constitutional provisions U-212, 213, 214, 218

World War, 1st W-110

World War, 2d R-146p, N-12q

Taxation without representation R-84, C-36

Taxidermy T-18-19

Taxon'omy, plant or animal classification B-116. *See also in Index* Classification

Tay, largest river of Scotland; rises near borders of Perthshire and Argyllshire, flows e. 120 mi., expanding into estuary at Firth of Tay.

Taylor, Ann (Mrs. Josiah Gilbert) (1782-1866), and Jane (1783-1824), English writers of verse for children; Rhymes for the Nursery contains Jane's "Twinkle, twinkle, little star."

Taylor, Bert Leston (1866-1921), newspaper man, born Goshen,

Mass.; the wit and wisdom of his daily column, 'A Line o' Type or Two' in the Chicago Tribune, signed "B.L.T." made him nationally famous.

Taylor, Brook (1685-1731), English mathematician; founded calculus of finite differences

mathematical study of sound S-198

Taylor, Frederick Winslow (1856-1915), efficiency engineer and initiator of scientific management in U. S., born Philadelphia, Pa.; worked as common laborer and machinist, and studied manufacturing conditions and methods; wrote 'Shop Management' and 'The Principles of Scientific Management'.

Taylor, George (1716-81), signer of Declaration of Independence as Pennsylvania delegate; born Ireland.

Taylor, Graham (1851-1938), American clergyman and sociologist, born Schenectady, N. Y.; founder and resident warden, Chicago Commons social settlement.

Taylor, Sir Henry (1800-86), English poet, for 48 years a confidential official in the Colonial Office, for which he wrote innumerable state papers; his best work is 'Philip van Artevelde', a poetic tragedy performed by Macready.

Taylor, Henry Osborn (1856-1941), author, born New York City; wrote on law and history of thought and institutions ('Ancient Ideals'; 'The Mediaeval Mind'; 'Freedom of the Mind in History'; 'Human Values and Vertices').

Taylor, (James) Bayard (1825-78), American poet, journalist, and traveler, born Kennett Square, Pa.; ambassador at Berlin, 1878 ('Poems of Home and Travel'; 'Views Afout'; translation of Faust').

Taylor, Jeremy (1613-67), English clergyman and author, called for his eloquence, "English Chryseostom" ('Holy Living'; 'Holy Dying'—popular devotional manuals)

Taylor, (Joseph) Deems (born 1885), composer, music critic, and radio commentator, born New York City; contributor to many publications ('The Highwayman', cantata; 'Through the Looking Glass', suite for orchestra; 'The King's Henchman', 'Peter Ibbetson', and 'Ram-uncho', operas; 'Of Men and Music' and 'The Well Tempered Listener', books).

Taylor, Joseph W. (1810-1880), physician and business man, born Monmouth County, N. J.; in tanning business Cincinnati, Ohio, 1835-51 Bryn Mawr college founded by, *picture* E-183

Taylor, Margaret Smith (1788-1852), wife of President Taylor W-91

Taylor, Rowland (died 1555), English protestant clergyman, burned at the stake in Queen Mary's reign for resisting restoration of the mass.

Taylor, Tom (1817-80), popular English dramatist and editor of *Punch* ('Our American Cousin'; numerous burlesques).

Taylor, Zachary (1784-1850), 12th president of U. S. T-20-1 administration (1849-50) T-20 buried in Louisville, Ky. L-209 Compromise of 1850 debates C-327-8, T-20-1

Fillmore vice-president F-34

gold rush S-1

Mexican War M-131-2, T-20

wife W-91

Taylor Grazing Act L-61c

"Tay Pay." *See in Index* O'Connor, Thomas Power

Key—cäpe, ät, fär, fäst, what, föll; mä, yet, förn, there; töc, bit; röw, wón, för, nót, dö; cäre, but, ryde, föll, bärn;

Tbilisi, U.S.S.R. *See in Index* Tiflis
Tchad, largest and northernmost colony in French Equatorial Africa; about 455,000 sq. mi.; pop. 1,435,000; cap. Fort Lamy; *map* A-42a
Tchad, Lake, also **Chad**, in w. cent. Africa A-36, S-317, *maps* A-42a, b
Tchakovsky. *See* Tschakovsky
Tchekhof. *See in Index* Chekhov
Tchitcherlin. *See in Index* Chicherin
Tea T-21-7
China T-21, 26, C-221a
 consumption per capita T-21
 cultivation and preparation T-21-3
 grades, sorting, *pictures* T-24, 25, 26
 green and black T-26, *picture* T-22:
 curing green tea, *picture* T-23
 how used in other countries T-26-7
Japan J-188: ceremony T-26-7, *pictures* T-21, M-69; Kyoto K-41
 planting in Java, *picture* E-142d
 producing regions T-21
 quality, how determined T-22
 tasting and blending T-27
 thein and tannin in T-22
 trade names, *picture* T-22
 yerba maté T-22, 27, *picture* S-205c
Tea-berry, or wintergreen, a creeping evergreen plant W-114
Teach, or **Thatch**, **Edward** (died 1718), Anglo-American pirate P-222
Teachers, American Federation of. *See in Index* American Federation of Teachers
Teachers, training of E-185-6, C-163
 teaching as a vocation V-322
Teachers College, in New York City; founded 1888; became part of Columbia University 1898; training of teachers and school administrators; educational research.
Teachers colleges E-186
Teaching. *See in Index* Education, subhead methods
'Teaching of the Twelve Apostles', apocryphal book of the New Testament B-104
Teague, **Walter Dorwin** (born 1888), industrial designer, born Decatur, Ind.; designed automobiles, business machines, New York World's Fair exhibits ('Design This Day').
Teak (*ték*), an East Indian tree with brownish oily wood T-27
 producing regions T-27: Borneo B-197; Burma B-278b; Java J-203; Thailand T-73b
Teal (*tél*), small river duck D-116, 118, *pictures* D-117
Tea Party, destruction of tea cargoes, sometimes with burning of ships, by American colonists in protest against British taxation
 Boston, Mass. R-83
 Maryland M-78
 New Jersey N-92
Teapot Dome, naval oil reserve in Wyoming, about 50 mi. n. of Casper, the center of the oil scandals of President Harding's administration H-220
Tear ducts E-352
Tear gas G-24-25
Tear glands E-352
Tea rose, a kind of rose with a scent like the tea blossom
 hybrid, *picture* R-157
Teasdale, **Sara** (1884-1933), American poet, born St. Louis, Mo.; married E. B. Fillingster 1914; divorced 1929; love lyrics admired for their feeling, simplicity, and melody ('Rivers to the Sea'; 'Love Songs'; 'Dark of the Moon'): A-182
Teasel (*té'sl*), or teazel, a plant with barbed burs T-81-2
Teasel (*té'zl*) family, or **Dipsacaceae** (*dip-sá-ké'sé-é*), a family of plants, native chiefly to the Mediterranean

region, including fullers teasel, scabiosa, and whorl-flower.
Teaselling, or teazelling, of textiles W-145, T-81-2, *picture* W-144
Tea stick, **wonigan stick**, or **dingle** C-47a, *picture* C-47
Teazle, **Sir Peter**, in Sheridan's 'School for Scandal', testy but good-hearted old aristocrat, jealous of his lively, pretty young wife.
Te'bu, or **Tibbu**, a nomadic people of the Sahara S-5
Technical education I-74n, E-182. *See also in Index* Agricultural education; Industrial education; Vocational education
Antioch College plan U-259
 mining engineering M-189
 schools and colleges U-257-8, 259
 textile school, Lowell, Mass. L-210
Technicolor process, in motion-picture photography M-278, 280
Technocracy, control of society by technical experts; remains a theory.
Technological unemployment M-10, I-74n, A-388, 391
 effect in U. S. H-336
 sewing machine riots H-347
Technology, the combination of knowledge and skill employed in the industrial arts and services. *See Outline* I-76-8
Tecumseh (*té-kúm'sé*) (1768-1813), Shawnee Indian chief T-27-8
 British aid W-9
Tedder, **Sir Arthur William** (born 1890), British air officer, active in development of R.A.F.; appointed British air commander in chief in Near East June 1941, Allied air commander in chief for Mediterranean theater Feb. 1943, and Allied deputy supreme commander for invasion of Europe Dec. 1943.
Te Deum (*té dé'm*), opening words of ancient Latin hymn of praise (*Te Deum laudamus*: We praise Thee, O God); in liturgy of Roman Catholic and Episcopal churches.
Tee, in curling C-414; in golf G-116
Teepee (*té'pé*), or **tepee**, tent of American Indians I-59, *pictures* I-54, 60
Teeswater cattle C-105
Teeth T-28-30, *pictures* T-29, P-203
 beaver B-70
 bird (fossil) B-120, *picture* B-121
 care of T-30, D-54, H-372
 cattle R-177
 deer R-177
 dentistry D-54
 disease germs lodge in G-30
 elephant I-175-6, E-246, *picture* E-244
 filing, African custom A-39
 fish F-70: pike P-213
 frog F-203
 gopher G-120
 horse H-341-2, 345
 ivory I-175-6
 rodents R-124
 ruminants R-177
 sawfish S-33
 shark S-102
 sheep and goats R-177
 snake S-171: poison fangs V-302-3
 sperm whale W-80
 toothless mammals Z-229
 ultra-violet ray examination R-15
 wolf W-128
 X-ray examination X-200
Teetotalism T-44
Tegea (*té'gé-á*), Greece, ancient city in Arcadia, near modern Tripolitza; engaged in many wars with Sparta, subdued about 550 B.C.
Tegner (*té'gē-nē'*), **Esalas** (1782-1846), Swedish romantic poet ('Frithjof's Saga', best known of all Swedish poems).
Tegucigalpa (*tá-gg-sé-gál'pá*), cap. of Honduras; pop. 43,000; old Aztec city: H-380, *map* C-132

Teguexin (*tá-gwéks'in*), or **teju** (*tá-yá'*), large lizard (*Tupinambis teguexin*) of family *Teiidae*, sometimes measuring 3 to 4 ft. including the long whiplike tail; found in tropical America: L-170
Tehachapi Mountains, in southern California; extend about 30 mi. n. e. from Tejon Pass to Tehachapi Pass, with Sierra Nevada to the northeast and the Coast Range to the west: C-25
Teheran (*tá-hé-rán'*), also **Tehran**, cap. of Persia (Iran) in province of Tehran, 70 mi. s. of Caspian Sea; pop. 350,000; large caravan trade, varied manufactures: P-130-1, *maps* A-242, A-332b
 antiques in palace R-172
 porcelain gate, *picture* P-132
 revolution of 1906 P-133
 2d World War conference W-179g, h
Tehuantepec (*tá-wán-tá-pék'*), Mexican, city in state of Oaxaca, 18 mi. from Pacific; pop. about 11,000.
Tehuantepec, **Isthmus of**, narrowest part of Mexico, between Gulf of Campeche and Gulf of Tehuantepec M-132b, 142, *map* N-150c
Teilhard de Chardin, **Père**, Catholic priest and paleontologist M-45, 46
Tejas (*té'ch'ás*), the word from which Texas got its name; an Indian greeting, signifying "friends" or "allies"; adopted by the Spanish explorers as name for Indians in e. Texas.
Teju. *See in Index* Teguexin
Tekakwitha, **Catherine** (1656-80), Mohawk Indian girl, born Auriesville, N. Y.; renowned for life of Catholic sanctity; lived on reservation at Caughnawaga, N. Y.
Tel Aviv (*tél á-vév'*), industrial city in Palestine on coast, near Jaffa; pop. 160,000: P-36, *map* A-332b
Telechron clocks W-41
Telegraph, electric and visual T-30-4. *See also in Index* Signaling automatic methods T-34
 cable, submarine C-4-9
 codes T-30
 communication speeded by C-32a
 early signaling systems T-30, *pictures* T-31
 Edison's inventions T-34, E-159, 161
 instruments T-32, *pictures* T-33
 invention T-30-1: Morse M-261-2
 mileage in various countries. *See table on next page*
 multiplex T-34
 news gathering, use in N-103-9
 regulated as public utility U-232
 ship's, engine room signals, *picture* N-46
 signaling, use in S-143
 stock quotations S-292
 telephotography I-117, T-41-2
 television T-41-2
Telegraph, wireless. *See* Radio
Telegrapher's cramp, prevention, *picture* T-83
Telegraph Hill, one of the hills on which San Francisco, Calif., is built; so named for semaphore that used to signal approach of mail ships.
Telegraph Plateau, of Atlantic Ocean A-358, C-9
Tel-el-Amarna (*tél-él-á-már'ná*) letters E-210, L-98a
Tel'dux, an automaton A-386
Telemachus (*té-lém-á-kús*), in the 'Odyssey', son of Odysseus and Penelope O-204, 206-8
Telemachus, monk whose death ended gladiatorial contests G-96, *picture* G-97
Tel'coasts, subclass of fish with well-developed bony skeletons.
Telepathy, apparent communication between minds without aid from

TELEGRAPH MILEAGE AND NUMBER OF TELEPHONES

COUNTRY	TELE- GRAPH	TELE- PHONES	COUNTRY	TELE- GRAPH	TELE- PHONES
World.....	6,730,000	44,200,000	Hungary.....	53,000	165,000
Argentina.....	165,000	434,000	Italy.....	278,000	611,000
Australia.....	108,000	662,000	Japan.....	233,000	1,368,000
Belgium.....	35,000	416,000	Mexico.....	100,000	176,000
Bolivia.....	5,000	3,000	Netherlands.....	9,000	434,000
Brazil.....	113,000	273,000	Netherlands Indies.....	20,000	53,000
Bulgaria.....	5,000	31,000	New Zealand.....	18,000	218,000
British India.....	366,000	83,000	Norway.....	22,000	235,000
Canada.....	367,000	1,397,000	Paraguay.....	4,000	4,000
Central America.....	23,000	33,000	Pern.....	13,000	32,000
Chile.....	30,000	84,000	Philippine Islands.....	10,000	33,000
China.....	100,000	160,000	Portugal.....	18,000	71,000
Colombia.....	22,000	42,000	Puerto Rico.....	2,000	17,000
Cuba.....	11,000	57,000	Rumania.....	48,000	102,000
Denmark.....	7,000	460,000	Spain.....	90,000	300,000
Ecuador.....	5,000	8,000	Sweden.....	14,000	865,000
Egypt.....	26,000	68,000	Switzerland.....	13,000	462,000
Eire (Ireland).....	22,000	46,000	Union of		
Finland.....	23,000	185,000	South Africa.....	30,000	220,000
France.....	317,000	1,590,000	United States.....	2,300,000	21,923,000
Germany.....	235,000	4,227,000	Uruguay.....	8,000	47,000
Great Britain and			U.S.S.R. (Russia).....	600,000	1,273,000
Northern Ireland	240,000	3,376,000	Venezuela.....	8,000	29,000
Greece.....	38,000	54,000	Yugoslavia.....	57,000	68,000

the senses. Duke University experiments in "extra-sensory perception," reported in 1934, attracted attention but have not been generally accepted.

Telephone T-34-7. For number of telephone instruments in various countries *see table above*
automatic answering A-386
Bell system T-37
broadcasts brought to studio by R-30

conference service T-37
conversations, etiquette C-347d
dialing system, picture T-36
dictograph D-68
exchanges T-35-6, picture T-37
invention and development T-34, T-36-7; Bell B-93-4; Pupin P-368a
long distance service T-36; ending distortion of speech E-230
public address systems T-37
regulated as public utility P-364
stock quotations S-292
transoceanic T-38
United States development T-37; compared to world, pictograph U-188a

Telephone, wireless. *See in Index Radio*

Telephoto camera, one with telescopic lens for long-range work P-185, picture P-182

Telephotography. *See in Index Television and telephotography*

Telephus (tél'ē-fūs), in Greek legend, son of Hercules and Auge, a priestess of Athena; married Laodice, daughter of Priam; wounded by Achilles: A-9

Telescope T-38-40
astronomy transformed by A-342
binocular T-39, S-286
Casegrainian T-38

Galileo's G-1, picture A-343
invention T-38
largest in world O-194, T-40, G-105
lenses L-96-8, T-38, 39, 40; glass used G-104-5; refractive index L-126-7

measuring images with micrometer M-155
mirrors T-38, 39, 40; fused quartz Q-3

Newtonian T-38, picture T-40
observatories O-193-4, G-105
periscope employs P-126
reflecting type T-38-9, G-105, pictures T-40
refracting type T-38, 40
small forms T-39
spectroscopes employ S-242, picture S-243

surveyor's transit and alidade S-332
transit type O-193, picture T-94

Telescopic camera, or telephoto camera P-185, picture P-182

Teletypesetter, device for setting type by telegraph; includes sending, receiving, and typesetting units; developed by F. E. Gannett of Rochester, N. Y., W. W. Morey of East Orange, N. J., and Morkrum-Kleinschmidt Company, Chicago.

Teletypewriter, or teletype, a telegraph-operated typewriter or "printer" T-32, picture T-33

weather data sent by W-62
Television and telephotography, electrical transmission of pictures, motion or still T-41-2

glow-lamp P-179
photoelectric cell, use of P-170
puppets P-388c

Televox, an automaton A-388
Telford, Thomas (1757-1834), Scottish engineer, famous for building roads, canals, and bridges R-112

Tell, William, legendary Swiss hero T-43-4

Schiller's play S-30

Tell, The, district in Algeria A-125

Telloz (tél'ō-zō), Gabriel (Tirso de Molina) (1571-1648), Spanish cleric and dramatist, born Madrid; said to have written more than 400 plays: S-236

Tell Hum, site of ruins in Palestine. *See in Index Capernaum*

Tellurium, a chemical element C-176, table C-188

Teleokbetoeng (tē-lōk-bā-tōng'), city in S. Sumatra; pop. 145,000: map A-332c

Tombor, or earthquake E-135-7. *See also in Index Earthquake*

'Téméraire (tā-mā-rē'), The Fighting, painting by Turner F-40-1, picture F-40

Temesvar (tēm'ēsh-vār), Rumania. *See in Index Timisoara*

Temne, or Thnni, Negro people of Sierra Leone, West Africa.

Tempera, pigment sized with glutinous substance painting P-15

Temperance T-44. *See also in Index Liquor laws; Prohibition*

Frances Willard's work W-99

Temperate zones, of earth E-133
advantages of living in C-271

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altitude, variation with C-270b;
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climate C-270-1: extremes C-270b
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low temperatures H-260-1; liquid air L-155; liquid helium H-271;

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sense of, in body T-118, 117
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water controls W-42-42a
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zones on earth E-133, C-270, 270b:
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Tempered glass G-104

Tempered scale P-213

Tempering, metals A-133, I-142

'Tempest, The,' comedy by Shakespeare T-44, S-100e

quotations from S-100b, T-44

Templar, Knights, a Masonic order. *See in Index Knights Templar*

Templars, Knights, a crusading order C-406, C-404

bankers B-43

Temple in London L-187

Template, in shipbuilding S-126

Temple, Henry John. *See in Index Palmerston*

Temple, Shirley (born 1929), motion picture actress, born Santa Monica, Calif.; began career at age of 3½ ('Little Colonel'; 'Little Princess').

Temple, Sir William (1628-99), English statesman, diplomat, and author; to curb power of France, negotiated the treaty of 1668 (Triple Alliance); devoted later part of life to literature

Swift secretary to S-342

Temple, William (born 1881), English divine, 98th Archbishop of Canterbury, from 1942; Bishop of Manchester 1921-29; Archbishop of York 1929-42; active member of Labor party.

Temple, Tex., manufacturing and trade city 35 mi. s.w. of Waco in agricultural and stock-raising region; pop. 15,344; cotton products, brooms; r.r. shops: map T-56

Temple, a building dedicated to religious services. *See also in Index Cathedral; Church architecture; Mosque; Pagoda*

Angkor Vat, Indo-China A-332, I-78d, pictures A-331, I-73; reproduction picture F-4

Boro Budor, Java J-205, picture J-204

cave temples, India H-385

Deir-el-Bahri, Thebes, picture A-251

Diana of Ephesus S-82, A-311, picture S-83

Honan, China C-79

Horus, Egypt, *picture* A-258
Jain, Calcutta, *picture* A-329
Karnak, Egypt E-208, *pictures* E-205, 208, 209, *color plate* A-260a-b
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Nabonidus, near Kish, *picture* A-258
Nara, Japan, *picture* J-201
Neptune, Italy, *picture* A-259
Pantheon, Rome R-146, E-331, A-261, *picture* A-260
Parthenon (Temple of Athena), Athens A-11-12, *color plate* A-260a-b. See also in *Index* Parthenon
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Saturn, Rome, *picture* A-259
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Solomon S-192, J-211, P-174
sun: Mesa Verde Park, Colo., *picture* C-270; Palmyra, *picture* P-40
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Wat Arun, or Wat Chang, Thailand, *pictures* T-73b, A-275
Zeus, Athens A-353, *picture* A-354
Temple, The, London. See in *Index* Inns of Court
Templeton, Alec (Andrew) (born 1910), pianist and composer, born Cardiff, Wales; blind from birth, but gifted with extraordinary ear for music; came to U.S. 1935; chiefly famed for his musical satires.
Templo University, non-sectarian institution at Philadelphia, Pa.; founded 1884; liberal arts and sciences, teachers college, schools of commerce, theology, law, medicine, pharmacy, dentistry, chiropody, nursing, fine arts, music.
Tempo, in music S-198, M-319
Temporal bone, a bone at the side of the skull S-156
Temuco (*tā-mq'hō*), Chile, capital of Cautín Province on Cautín River 140 mi. s. e. of port of Concepción; pop. 98,000; in rich grain, livestock, and lumber district; produces flour, spaghetti, tannin extract, leather, boxes, foundry products: *map* C-206
Tenant farming
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Argentina A-279
Chile C-207b, d, *picture* C-207c
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Ten Commandments M-265, *picture* J-215
Tender, U. S. Navy vessel N-58a
Tenderfoot, in Scouts B-215, G-94
Tenderfoot, one who is new to life on the range C-110
Tenderloin, a cut of beef, *picture* M-101
Tendon, a fibrous cord of connective tissue by which a muscle is attached to a bone or other structure M-304
Achilles' tendon, why so called A-9
hand H-207
Tenements
Chinese quarters C-218
Cleveland, *picture* R-146m
London slum clearance L-190-1
model S-114, *picture* S-113
New York City, *picture* C-242
Tenerife (*tēn-ēr-īf*), also Tencriffe, largest of Canary Islands; 782 sq. mi.; pop. 180,000: C-70, *map* A-42a
Teniers (*tēn'yērs*), David (1610-90), the younger, noted genre painter of Flemish School; son of David Teniers the Elder (1582-1649), also an important Flemish painter.
Tenite, a synthetic plastic P-246

Ten'nant, . Smithson (1761-1815), English chemist, discoverer of osmium and iridium.
Tennessee, a s. cent. state of U. S.; 42,246 sq. ml.; pop. 2,915,841; cap. Nashville: T-44-B, *maps* T-46, U-188c
agriculture T-45-6, *picture* T-47
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caves in Cumberland Mts. C-118
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De Soto's expedition D-56
Boone explores B-192
state of Franklin organized T-48
John Sevier S-85
Civil War T-48, T-82, C-254, 255: battles of Shiloh and Chattanooga S-116, C-157
Andrew Johnson J-223
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mineral resources T-46
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natural features T-44-5
products T-46, *chart* T-46, list T-44
railroad, beginnings C-157
rivers T-45
tobacco industry T-103
Tennessee, University of, at Knoxville, Tenn.; non-sectarian; founded as Blount College 1794; liberal arts, commerce, engineering, agriculture, home economics, law, graduate school; medicine, dentistry, pharmacy, and nursing at Memphis; junior college at Martin
science building, *picture* T-47
Tennessee River, tributary of Ohio River T-45, T-49, A-98d, *maps* T-46, A-98, K-11
early route to West U-184, C-156-7
Tennessee Valley Authority (TVA) T-49
Tonnel (*tēn'ī-ēl*), Sir John (1820-1914), English political cartoonist, on staff of *Punch* for 50 years; work noted for humor and satire
illustrates 'Alloe in Wonderland' and 'Through the Looking Glass' C-87, L-157, *pictures* C-87, L-163
Tennis T-49-50
books about H-313c-d
chief strokes T-50, *pictures* T-51
court T-49, *diagram* T-49
Tennis ball T-49, R-168
Tennis Court Oath, in French Revolution so called because taken in an indoor tennis court F-201, E-305
Ten'nyson, Alfred, first Baron (1809-92), English poet T-50, T-52, *pictures* E-287, T-52
Arthurian legends used A-316, T-52
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Tenochtitlán (*tā-nōch-tēt-lān*), Aztec city A-408-9, 410, C-372, 373
'Ten o'Clock Address, The', treatise on art by Whistler P-26
Tenor, in music, the highest male voice: range, *diagram* S-198
Ten-plin, or bowling B-207
"Ten Pins, Human," game P-257
Tense, of verbs V-281
Tensile strength, in physics P-190
tungsten T-150
Tenskwatwa, or The Prophet (1775?-1834), Shawnee leader, brother of Tecumseh; preached return of his people to primitive ways: T-28

Tent S-111. See also in *Index* Shelter, subhead tents
camping C-45, *pictures* C-42-45
Tentacles, long flexible grasping organs
cephalopods M-218
cuttlefish C-415, 416
feelers of coral C-364
hydra H-366, *picture* H-365
jelly-fish J-209, *picture* J-210
nautilus N-44
octopus C-417
sea-anemones S-66
snail and whelk M-218, S-168
squid C-416, *pictures* C-415, 417
Tent caterpillar, caterpillar of moth of the genus *Malacosoma*; the moths lay eggs in rings fastened around twigs of trees; caterpillars hatch in early spring and spin web shelters from which they come out to feed, damaging foliage
cuckoo feeds on C-413
Ten'ure of Office Bill, passed by Congress 1867; made removals from office by the president dependent upon "the advice and consent of the Senate"
Johnson violates J-224
Ten Years' War (1868-78), guerilla conflict fought by Cubans for independence from Spain; movement led by Carlos Manuel de Céspedes; ended with Treaty of Zanón by which Cuba received slight gains in representative government and provisions for gradual emancipation of slaves; war gave Cubans a realization of their power and was first step toward political independence.
Teocentii, or teesinti, a wild grass A-149, G-181b
Teotihuacán (*tē-ō-tē-wā-kān*), ancient Toltec city in Mexico wall, *picture* A-275
Tepary bean B-65
Tepee. See in *Index* Teepees
Tepetate-Casano (*tā-pā-tā'tā kā-sā-ānō*), oil pool P-145
Teple (*tā-pēk'*), Mexico. See in *Index* Nayarith
Terblum, a chemical element, *table* C-168
Terborch (*tēr'bōrk*), or Terburg, Gerard (1617-81), famous Dutch genre and portrait painter; noted particularly for his excellent rendering of fabrics ('The Letter'; 'The Concert'; 'Guitar Lesson')
'Lady Playing a Lute', *picture* M-317
Tereen'tenary (Latin *ter*, thrice, plus *centenary*, a hundred), relating to a period of 300 years; a 300th anniversary.
Ter'ebinth, a tree of the genus *Pistacia*, which also includes pistachio nut; resembles the ash, but smaller; original source of turpentine.
Tere'do, or shipworm, a mollusk which bores into wood T-52, S-107
cables damaged by, *picture* C-4
storks eat N-69
Terek (*tyēr'ēk*), river in s. Russia, rises in glaciers on n. slope of Caucasus Mts.; flows e. 400 mi. into Caspian Sea.
Ter'ence (Publius Terentius Afar) (185?-169? B.C.), Roman dramatist, born Carthage ('Andria'; 'The Self-Tormentor'; 'Phormio'); L-68
freedman S-160
inspired by Menander D-93
Teresa (*tā-rā'sā*), or Teresa de Cepeda, Saint (1515-82), Spanish nun; famous mystic, 2d patron saint of Spanish monarchy and founder of the Barefooted Carmelites; canonized in 1622; feast day October 15
sculpture by Bernini S-53, *picture* S-60

ü=French u, German ü; gem, *go*; *thin*, *then*; ñ=French nasal (Jean); zh=French *z* (as in *azure*); k=German guttural *ch*

Tereus (*tě'rys*). See in Index Philomel

Terhuno, Albert Payson (1872-1942), American writer, born Newark, N. J., son of Mary Virginia Terhune; best known for adventure and dog stories ('Lad' stories; 'To the Best of My Memory', autobiography).

Terhune, Mary Virginia (Marion Harland) (1831-1922), American author, born Richmond, Va.; wrote a number of novels but is remembered chiefly for her articles and books on domestic subjects ('Common Sense in the Household').

Terias nicippo, a butterfly genus (small sulphurs), color plate N-38a-b

Terman, Lewis Madison (born 1877), American psychologist, professor at Stanford University
intelligence tests I-96-7

Terminal velocity, highest rate of speed of falling bodies.

Terminology. See in Index Vocabulary; Words

Term insurance, a limited form of life insurance I-95

Terminus (*tě'r-mi-nūs*), Roman god of public and private boundaries; his festivals observed by neighbors on common boundaries of their lands and by sacrifices at borders; *termini* or marking stones were never to be tampered with under severe penalty.

Termitary (*tăr'mi-těr-i*), nest of a termite T-52a

Termite, the so-called "white ant" T-52a-b
Australian plague A-375
nest, picture T-52b, color plate A-360

Termonde (*těr-mōnd'*), Belgium, fortified town on Scheldt River, 20 mi. s.w. of Antwerp; pop. 10,000; taken by Germans in drive on Antwerp and destroyed September 1914; rehabilitated after 1st World War; occupied by Germans 1940.

Tern, or sea swallow, gull-like bird G-185-6, pictures G-185, 186, 187, color plate B-133
migrations B-185, B-146

Ternate (*těr-nă'tă*), Netherlands Indies, island in Molucca group, e. of Celebes and near w. coast of Halmahera; 53 sq. mi.; pop. 10,000; chief town Ternate (pop. 6000). Administrative area includes part of Dutch New Guinea; map F-10b

Terne plate T-98

Terni (*těr'nē*), Italy (ancient *Interamna*), manufacturing city 50 mi. n. of Rome; pop. (commune) 71,000; near famous falls of Terni; government arsenal, iron, steel, textile manufactures; Neapolitans defeated by French 1798.

Terpsichore (*těrp-sik'ō-rē*), in Greek mythology, muse of dancing M-305, picture A-228

Terra (*tě'ră*), Gabriel (1878-1942), president of Uruguay (1931-38) U-263

Terra australis incognita, "unknown southern land" A-217

Terrace, in geology, stretch of elevated, level land along banks of a river, lake, or ocean; frequently occur in series, one rising above the other. Artificial terraces are used effectively in landscape gardening and in agriculture to hold moisture and prevent erosion
Chinese rice field, picture C-215
Philippine Islands, picture P-167
Rhine, picture G-71

Terraclina (*těr-ră-chē'nă*), Latin *Tarracina*, Italy, historic town, 56 mi. s.e. of Rome; pop. 10,000; remains of ancient Forum and temple.

Ter'ra oot'ta (from Italian *terra*, earth, and *cotta*, cooked), a hard-baked, brownish-red earthenware, frequently glazed and colored; used for tiles, bricks, and objects of art
building, use in B-264, pictures B-265; C-360
Della Robbia's work P-331, picture P-334
lamps, prehistoric L-56
Tanagra figurines P-330

'Terra Nova, Captain Scott's ship S-43

Terrapin, a turtle T-167-8, picture T-166
called marsh tortoise T-116

Terrarium, a small enclosure, usually with glass sides, used for housing and studying land animals
for reptiles and amphibians N-42-43

Terre Haute (*těr'rē hōi*), Ind., manufacturing and shipping point on Wabash River 70 mi. s.w. of Indianapolis; pop. 62,693; coal mining, farming, and clay region; state teachers college, Rose Polytechnic Institute; St. Mary of the Woods College near by; map I-46
Harrison fortifies T-28
manufactures I-48

Terrell, Tex., industrial city 38 mi. e. of Dallas; pop. 10,481; cottonseed, lumber, agriculture; Texas Military College.

Terrestrial magnetism, magnetism of the earth M-34, E-132
aurora borealis A-365, picture A-366

Terrier, dog D-80-1
kinds B-84, 82, 83, pictures D-79, 80, 82, 83

Territorial annexation, in international law I-109

Territorial waters, in international law I-109

Ter'ritories (U. S.), possessions of the United States comprising "incorporated territories" (Alaska, Hawaii) and "unincorporated territories" (Puerto Rico, Virgin Islands, and formerly the Philippines); the former enjoy full rights under Constitution; the latter limited rights, particularly in the matter of tariffs and jury trials
Alaska A-100-7
Congress controls U-216
during Civil War, map C-249
government of N-171, U-231, 232;
Ordinances of 1785 and 1787 A-318
Hawaii H-239-45
Puerto Rico P-307-11
Virgin Islands V-309

Tor River, Spain, rises in the Pyrenees in the n.e. corner, flows s. and e. 110 mi., entering the Mediterranean by several mouths s. of the Gulf of Rosas.

Terror, The, or Reign of Terror, in French history F-204. See also in Index Reign of Terror

Terry, Alfred Howe (1827-90), American general, born Hartford, Conn.; served throughout Civil War, and in 1876 commanded main column which drove Sitting Bull into Canada after Custer massacre; C-415
Fort Fisher attack F-305

Terry, Eli (1772-1852), New England watchmaker W-39

Terry, Elijah, Indian fighter N-165

Terry, Ellen (1848-1928), English Shakespearean actress, long associated with Sir Henry Irving; she had few rivals in the grace and intellectual grasp with which she portrayed characters such as Portia, Lady Macbeth, Desdemona, and Cordelia.

Terry, Sir Richard Runciman (1865-

1938), English musician; organist and choir director Roman Catholic Cathedral, Westminster, London, 1901-24; greatly improved music used in churches.

Terry cloth, fabric with heavy loop pile; used for Turkish towels, and when dyed or printed for bathrobes, drapery, etc.

Tortuary colors C-308b

Tertiary (*těr'shē-ā-rē*) time, in geology G-40, 45
petroleum formation P-145

Tertul'lan (155?-222? A.D.), one of great Church Fathers; creator of Christian Latin literature.

Teschen (*těsh'én*), Polish Cieszyn, city and district in former Austrian Silesia; about 850 sq. mi.; important coal mines; road and railway center; after 1st World War, disputed by Poland and Czechoslovakia; in 1920, Conference of Ambassadors gave city and farm region to Poland, suburb and mine district to Czechoslovakia; Czech area ceded to Poland 1938; annexed by Germany 1939; map C-422

Teschen, Peace of, 1772 M-63

Tesla, Nikola (1857-1943), American electrical inventor, born Austrian Croatia; son of Greek priest; American citizen since 1884; discovered method of transmission of electrical power, the principle of the rotating electric field and (1888) the induction motor; invented radio control of ships and many electrical devices; after 1903 worked chiefly on the development of radio, and the transmission of power without wires: I-116

Tes'sclated mosaics M-262

'Tess of the D'Urbervilles', novel by Thomas Hardy H-220

Test acts, legislation of English Parliament imposing religious tests on government officials; most celebrated are the Corporation Act 1661, and Test Act 1673.

Testator, maker of a will W-98

Testing. See also in Index Strength of materials

airplanes: wind tunnel U-227, picture A-79
automobiles A-391
bridges B-239-40

corn, seed, picture C-366a
lighting, indirect glare H-375
metals, borax bead test B-194
textiles: cotton and wool W-140
U. S. Bureau of Standards, work of U-227

Tetry (*těs-trě*), France, small town near Somme River, n. of Soissons; battle of (687), *chari* H-300

Tests and measurements, in education. See in Index Achievement tests; Intelligence tests

Testu-Brissy (*těs-tīl' brě-sě*), balloonist, picture B-25

Tet'anus, or lockjaw A-223, 224
bacilli, picture B-12
puncture wounds cause, prevention F-65

Tet'any, disease, characterized by spasms
removal of parathyroid causes G-100

Totens (*tă'těns*), Johann Nicolas (1786-1807), German psychologist; based his system of psychology entirely on observation of experiences ('Essay on Human Nature').

Teter'nikof (*těd-tyěr'ně-kōf*), Feodor Kuzmich (pen name Feodor Sologub) (1868-1927), Russian novelist and poet R-197

Tethymosis III. See in Index Thutmose

Tethys (*tě'this*), in Greek mythol-

Key—cāpē, át, fār, tǎst, what, fgl; mǎ, yǎt, fǎrn, thǎre; tǎe, bīt; rǎw, wǎn, fǎr, nǒt, dǎ; cǎre, bǎt, ryde, fǎll, bǎrn;

ogy, wife of Oceanus and mother of the Oceanides.

Teton, a division of the Sioux Indians, consisting of several tribes, living in North Dakota and South Dakota, with a few in Montana.

Teton Mountains, a range of the Rocky Mts. in n.w. Wyoming, *map* W-194

Tetraethyl lead, a colorless liquid $Pb(C_2H_5)_4$, formed by reaction of ethyl chloride and lead sodium amalgam; mixed with ethylene bromide, it is added to gasoline to produce "ethyl" motor fuel; because of poisonous properties, fuels so treated are required by law to contain a dye

"anti-knock" properties P-150

Tetragonal crystals M-182

Tetra marigold P-245f

Tetrameter, in poetry P-269

Tetrarch, originally, among the Greeks, the ruler of one of four divisions of a country; later, among the Romans, a minor ruler under the emperor, as Herod Antipas: H-287

Tetrazzini (tā-trāt-sē'nē), Luisa (1874-1940), Italian coloratura soprano; sang in grand opera and on concert stage; most famous for leading roles in 'La Traviata'; 'Figlietto'; 'Lucia di Lammermoor'; author of 'My Life of Song'

Tetuán (tē-twān'), cap. of Spanish Morocco; 80 mi. s.e. of Tangier; pop. about 50,000; connected by railroad to Ceuta; *map* A-42a

Tetzl (tē'tsēl), Johann (1455?-1519), Dominican friar whom Luther opposed: L-221, R-65

Teucer (tē'sēr), in Greek mythology, the first king of Troy; also name of the best Greek archer in the Trojan War, stepbrother of Ajax

Teuchos A-254; statue, *picture* S-61

Toufelsdrückh (to'fēls-drāk), Diogenes, in Carlyle's 'Sartor Resartus', its fictitious author, professor of Things in General at Weiss-nichtwo.

Teutoburger (toi'tō-burg-ēr) Forest, Germany, series of wooded hills on Westphalia-Hanover border extending 70 mi. from n.w. to s.e.; at battle here (9 A.D.), the Roman army under Varus was destroyed by a German chieftain, Arminius (Hermann).

Teutones (tē'tō-nēz), German tribe which gave name to Teutonic peoples T-52b

Marius defeats R-134

Teutonic invasions T-52b, E-322-3. See also in *Index* Northmen

Goths G-123-4

Teutonic Knights, a military and religious order arising during Crusades C-408, 407

Christianize Baltic regions: Estonia E-306; Latvia L-71; Lithuania L-184

conquer Prussia P-358

Danzig ruled by D-14

wars with Poland P-279

Teutonic languages, or Germanic languages G-60, 82, F-171

English E-281-2

Teutens, group of European peoples T-62b, R-10. See also in *Index* German tribes

contribution to civilization C-247

self-government D-46

Tewa, a division of the Tanoan linguistic stock of Indians living in several pueblos in Rio Grande Valley, New Mexico, and the pueblo of Hano, Ariz.

Tewfik Pasha (1852-92), khedive of

Egypt, son of Ismail; became khedive 1879; made effort to establish order in his country, but under Lord Cromer's persuasion abandoned the Sudan in 1884: E-200

Towkesbury (tōks'bēr-i), England, historic town in n. Gloucestershire on the Avon; remains of famous Benedictine abbey; Yorkists defeated Lancastrians 1471 in Wars of the Roses.

Texarkana, Tex. and Ark., two cities about 30 mi. from s.e. corner of Oklahoma, forming one community commercially and industrially; pop. (Texas) 17,019; (Arkansas) 11,821; large trade; cotton products, furniture, lumber, fertilizer; truck farming: *maps* A-298, T-56

Texas, a state in s.w. U.S.; largest in the Union, 267,839 sq. mi.; pop. 6,414,824; cap. Austin: T-53-61, *maps* T-54, T-56, U-188b-c

agriculture T-53, 56, 57; honey B-76; pecans P-93, 100

Big Bend National Park Project N-20

bird, state B-122

Black Waxy Belt D-5

cattle industry: early days C-107-8; northward drive C-110-12

cities T-56-8, list T-53. See also in *Index* names of cities

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cotton boll-weevil I-89

education T-58-9, *picture* T-60; Dallas D-6; Fort Worth F-161; Houston H-348

export trade: Galveston G-3; Houston H-346

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flower, state S-279

forests, national and state, *table* F-250

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Austin and war for independence A-367

Sam Houston H-346

annexation to U. S. P-298

loses part of "panhandle" O-219

boundary dispute and Mexican War M-131-2

missions S-222

admission to the Union T-60

growth in population T-58

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products T-53-4, *chart* T-54, list T-53

rivers T-56; Rio Grande R-109

soil conservation E-145e

state police T-80, P-288, *picture* P-287

Texas, Agricultural and Mechanical College of, at College Station, Tex.; state institution founded 1876; arts and sciences, architecture, veterinary medicine, petroleum engineering, graduate school.

Texas, University of, at Austin, Tex.; state control; opened 1883 (organized 1881); arts and sciences, law, engineering, education, business administration, pharmacy, fine arts; graduate school; medical branch at Galveston; mines and metallurgy at El Paso: *picture* T-60

Texas Centennial Central Exposition, at Dallas D-8

Texas Christian University, at Fort Worth, Tex.; founded 1873 by Disciples church; arts and sciences, theology, education, fine arts, business administration, graduate school.

Texas City, Tex., town across Galveston Bay from Galveston; pop. 5748; sugar refineries; huge government-owned tin smelter built here because of low-priced fuel and good shipping facilities.

Texas College of Arts and Industries, at Kingsville, Tex.; state institution founded 1929; arts and sciences, graduate school.

Texas fever, or tick fever, an infectious disease of cattle C-107

Texas kingfisher K-21

Texas longhorns C-103

Texas mimosa. See in *Index* Catclaw

Texas opossum O-235

Texas Rangers, state police P-288, T-60, *picture* P-287

Texas State College for Women, at Denton; founded 1901 as College of Industrial Arts; arts and sciences.

Texas Technological College, at Lubbock, Tex.; state institution founded 1923; agriculture, engineering, home economics, arts and sciences; commerce, military science, graduate school.

Texcoco (tēs-kō'kō), Lake, Mexico; near Mexico City M-144

Textile design

Arabic T-63-4

batik D-122, T-86, *picture* A-327

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Chinese T-62; design in English chintz, *picture* T-67

classic to Romantic T-87

Egyptian T-61, 82; Coptic, *picture* T-63

English T-68, *picture* T-67

French T-84-5, 87, 68, *picture* T-68

Gobelin tapestries T-85

Gothic tapestries T-65

Greek T-61

India T-85, 86; tree of life design, *picture* T-86

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Louis XIV, XV, and XVI T-67

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Mohammedan influence T-63

Paisley shawl, origin, *picture* R-110

Palermo silks T-84

Persian T-63, *picture* T-64

Peruvian poncho, *picture* T-83

Renaissance: brocades, *picture* T-67; silks T-64; tapestries T-65

Spanish T-64

tapa cloth, *picture* C-275

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tree of life, Indian pattern T-88

Textile Foundation, Inc., in U. S. government U-227

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Persia T-63, S-145, picture T-64
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wool W-140-5, T-69; artificial W-145, picture P-2461. *See also in Index* Wool
- Textolite**, a synthetic plastic P-246
Thackeray (*thăk'êr-i*), William (1811-63), English novelist T-71-3, B-287
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influence on novel N-182
outstanding events of life T-71
witicism C-347b
- Thaddeus** (*thă-dê'us*). *See in Index* Judas (Thaddeus)
- Thal** (*th*), or **Tal**, large group of tribes in S. China and Indo-China speaking Siamese-Chinese languages.
- Thailand** (*th'land*), formerly Siam, a country of the Indo-Chinese peninsula; 200,000 sq. mi.; pop. 14,465,000; cap. Bangkok; T-73a-b, map A-332c
Bangkok B-38
climate T-73a
commerce T-73b, table C-480
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white elephant E-248, T-73a
- Thais** (*thă-êr*), opera by Massenet, story O-233-4, picture O-229
- Thakembau**, former king of Fiji Islands F-33
- Thalamus**, in brain B-221, picture B-220
- Thaler** (*thă'êr*), former German silver coin worth 71 cents when current; monetary unit of several German states before mark was adopted; Maria Theresa thaler of about the same value was minted in Austria, used in Arabia, Ethiopia, Eritrea. *See also in Index* Dollar
- Thales** (*thă'les*) of Miletus (640?-546? B.C.), first Greek philosopher, one of the "seven wise men"; taught that water was the basic substance of all things; said to have predicted an eclipse
abstract geometry founded by G-46
electric properties of amber noted E-231
- Thalassa**, an ichneumon fly I-6
- Thalia** (*thă-lî'ă*), in Greek mythology, one of the three Graces. *See in Index* Graces
- Thalia**, Muse of comedy M-305, picture A-228
Aphrodite and A-227
- Thalictum** (*thă-lîk'trûm*). *See in Index* Meadow rue
- Thallium**, metallic element discovered 1861 by Sir William Crookes; soft, malleable, low tenacity, color gray; occurs in pyrite, zinc blende, and hematite; forms alloys with mercury, cadmium, zinc, silver, copper, and magnesium; poisonous; used as rat poison, insecticide, and depilatory; table C-168
- Thalophytes**, plant group containing most primitive types P-246
- Thames** (*thăms*), estuary in e. Connecticut, 15 mi. long, map C-336
- Thames (têms)**, largest river of England T-74, B-280, map E-270a
London L-185, 187, picture L-185: Tower Bridge, picture B-241
Thames, river in Ontario, Canada, on which London is situated; flows 160 mi. into Lake St. Clair.
- Thames, battle of the**, in War of 1812 W-10, H-232
Tecumseh killed T-28
- Thames Embankment**, London L-187
- Thanatopsis**, poem by Bryant B-265
- Thanatos** (*thăn'ă-tôs*), in Greek mythology, god of death, brother of Hypnos (Roman Somnus); called Mors in Roman mythology.
- Thane**. *See in Index* Thegn
- Than'et**, Octave, pen name of Allee French (1850-1934), American novelist, born Andover, Mass. ('Explication'; 'The Heart of Toil').
- Thanksgiving**, American holiday T-74
colonial proclamation, picture T-75
first celebration, picture H-319
- Tharaud** (*thă'rô*), family name of two French brothers, Jérôme (born 1874) and Jean (born 1877), who together write fiction, biography, and war and travel sketches. English translations include 'The Long Walk of Samba Diouf', 'When Israel Is King', 'Spain and the Rift'. Gougeon prize 1906.
- Thar** (*thăr*) Desert, n. India, embracing part of Sind and Rajputana climate I-33
- Thasos** (*thă'sôs*), or **Thasus**, Greek island in n. Aegean, off coast of Thrace; pop. 8000; according to tradition, earliest colonists were Phoenicians; led by Thasus, son of Poseidon, they exploited the gold mines here; map A-25
- Thatch**, or **Teach**, Edward (died 1718), Anglo-American pirate P-222
- Thatched dwellings**. *See in Index* Shelter, *subhead* thatched dwellings
- Thaxter**, Oelia (1886-94), American poet, born Portsmouth, N. H. ('Drift Weed'; 'Stories and Poems for Children').
- Thuyendanecca**. *See in Index* Brant, Joseph
- Thayer** (*thă'êr*), Abbott Handerson (1849-1921), American artist and naturalist born Boston, Mass.; known for portraits, landscapes, ideal figures, and animal paintings; work has monumental quality; notable mural in Bowdoin College protective coloration theory P-354
- Thayer, William Roseoe** (1859-1923), American writer and editor; born Boston, Mass.; best known for works on Italian history ('The Dawn of Italian Independence'; 'A Short History of Venice').
- Theaceae** (*thê-ă'cê-ê*), tea family C-39
- Theater** T-74-7. *See also in Index* Drama; Opera; Puppets and marionettes
American Colonies A-166, U-235
Chinese C-221g
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puppets and marionettes: making a stage P-368d; Munich theater P-368b
Roman T-76, picture I-171
state, Austria A-379
- Thebaïs**, Egypt, desert region near Thebes
medieval hermits M-232
- Thebes** (*thêbz*), Egypt, ancient cap. of Upper Egypt, on Nile, on site of modern villages of Karnak and Luxor; famous temples: B-208-9, C-17-18, E-106, maps B-8, E-197
temple of Deir-el-Bahri, picture A-251
- Thebes**, Greece T-77-8, map A-25.
For modern town *see in Index* Thival
- Cadmus** legend C-11
Oedipus legend O-208
Sparta, war with T-77-8
- Theed**, William (1804-91), English sculptor ('Prince Albert', at Coburg, Germany).
- Thegn**, or **thane** (from Anglo-Saxon word for servant or soldier), one of class of minor nobles in Anglo-Saxon times; charged with administration of justice and other offices in king's service; picture J-230
- Thein** (*thê'in*), an alkaloid in tea T-22, C-298
- Theiss** (*thîs*), or **Tisza** (*tî'ză*), river of s.e. Europe; rises in Carpathian Mts.; flows s. with many windings 870 mi.; H-360, maps B-18, A-381
- Theme**, in music, a musical phrase developed with variations and embellishments throughout a composition
- leit-motifs** in Wagner's operas M-314
- Themes**, how to write W-185-91. *See also in Index* Writing, art of
- Themis** (*thê'mîs*), in Greek mythology, one of the Titans, goddess of eternal law and order; by Zeus she became mother of the Hours and the Fates; in art she is usually pictured with cornucopia and scales.
- Themistocles** (*thê-mîs'tô-klês*), (514?-449 B.C.), a great Athenian general and statesman
Aristides and A-282-3

Key—câpe, ât, făr, fâst, whet, fgl; mē, yăt, făr, thêre; ice, bît; rōw, wôn, for, nôt, dq; cûre, bût, ryde, fûl, bûrn;

- Athenian Empire, lays foundations of G-158
long walls A-353
Salamis, battle of S-13, P-138
Theobald, Lewis (1688-1744), English writer and editor; celebrated as a textual critic; most important work is a 7-vol. edition of Shakespeare; plays and poetry of less value.
Theobromine, alkaloid in cocoa and chocolate C-224
Theocracy, a state acknowledging God as immediate sovereign and in which the clergy have authority in both civil and religious affairs; kingdom of Israelites notable example
colonial Massachusetts A-154
origin of F-10
Theoritus (*thē-ōk'ri-tūs*) (3d century B.C.), first and greatest of Greek pastoral poets G-174
Theodolite, an instrument for measuring angles, used in surveying S-332
Theodora (died 547? A.D.), consort and colleague of the Byzantine emperor Justinian I; originally dancer and actress; harsh and cruel but able ruler: J-232, B-290
portrayed in mosaic, picture P-15
Theodore of Amasea (surnamed Tro or Tyro), Saint, martyr, born Syria or Armenia; recruit in Roman army; tortured and burned to death about 306 A.D.; festival November 9.
Theodore III (1818-68), emperor of Abyssinia; succeeded his uncle as chief of Kwara and after many conquests was proclaimed emperor 1855
opposes British E-309
Theodorle (*thē-ōd'ō-rīk*), the Great (454?-526), king of the Ostrogoths, greatest Gothic ruler; in German legend became the hero Dietrich of Bern: G-123
literary activities B-179
postal system P-320
tomb at Ravenna R-53
Theodosius, the Great (346?-395), Roman emperor, succeeded 379; conquered frontier barbarians; prohibited heathen worship, closing all pagan temples, and abolished Olympic Games; recognized orthodox Catholicism; accepted penance prescribed by St. Ambrose for Thessalonica massacre.
Theogony, by Hesiod G-171
Theophrastus (*thē-ō-frās'tūs*) (372?-287 B.C.), Greek philosopher, successor of Aristotle as head of Peripatetic School G-174
Theorem, in geometry G-49
Theory, in music M-318-19
Theosophy, a philosophic-religious system which claims special insight into the nature of God and explains therefrom the fundamental laws of the universe. The term, which means "wisdom of God," is applied to the beliefs of various theosophical societies, in America and other countries. The original Theosophical Society was organized in 1875 in New York City by Mme. Helena P. Blavatsky. It stresses universal brotherhood and reincarnation by which the soul progresses toward perfection.
Theotocopuli (*thē-ō-tō-kō-pō'lē*), Dominican. See in Index Greco, El
Thera, island. See in Index Santorin
Therapeutics (*thēr-d-pa'tīks*), or therapy, part of medical science which relates to treatment and remedies for disease. See in Index Medicine and surgery
Therapy, light. See in Index Light therapy
Therapy, mental P-361, 362, M-109
hypnotism used in H-378
Theremin, musical instrument invented by Leon Theremin, Russian scientist and musician (born 1896), utilizing the performer's body as an electrical control. Tones are produced by varying movements of the right hand and fingers in the electro-magnetic area about a vertical rod at the right of the instrument; volume is controlled by movements of the left hand about a metal ring at the left.
Theresa, Saint, Spanish nun. See in Index Talca, Saint
Thérèse, Saint (*tā-réz'*) (The Little Flower) (1873-97), French Carmelite nun, born Alençon, France; entered convent at 15; died at 24, having promised "to spend my heaven doing good upon earth"; canonized 1925; feast day, September 30.
Thermae (*thēr'mē*), Roman baths R-140, 148, P-300, picture R-145
Thermal springs, in geology, hot springs S-283
Thermal unit, British (b.t.u.) H-260, 282, picture H-261
Thermic sense, sense of temperature T-116, 117
Thermionic valve. See in Index Vacuum tube
Thermit, a metallic mixture used in welding A-139, picture C-172
Thermochemistry, the part of chemistry which deals with the study of heat in chemical reactions.
Thermocouple, a heat-measuring device T-79, E-226
detects infra-red waves R-14
Thermocouple pyrometers, or thermoelectric pyrometers P-373
Thermodynamics, the science that treats of relations between heat and power P-194. See also in Index Heat
Thermoelectric effects, basic action explained E-226
Thermoelectricity, branch of science which deals with relation of electricity to heat production or absorption.
Thermoelectric pyrometers, or thermocouple pyrometers P-373
Thermograph, a temperature-recording device T-79
Thermometer, a device for measuring temperature T-78-9
aircraft engines A-78
Centigrade T-78
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Fahrenheit T-78
Galileo devised simple form G-2
pyrometers P-373, E-226
Thermopile, a heat-measuring device T-79
radiation pyrometer P-373
Thermoprene, a rubber paint R-168
Thermopylae (*thēr-mōp'i-lē*), pass leading from Thessaly into central Greece, where Spartans heroically attempted to check Persian invasion: T-79, P-136, map G-154
Thermos bottle, picture V-268
Thermostat, for regulating temperature H-285, T-79, picture H-265
Thersites (*thēr-sī'tēs*), in Homer, the one ugly, slanderous brawler among the Greeks before Troy.
Thesauri (*thē-sē'ūm*), best preserved of ancient Greek temples; correct name, the Hephaestum A-355
Theseus (*thē-sē-ūs*), Greek legendary hero, slayer of Minotaur T-79
Centauri conquered by C-130
Thespie (*thēs'pī-ē*), ancient Greek city of Boeotia near foot of Mt. Helicon; enemy of Thebes; served national cause against Persians.
Thes'pis (*thēs'pīs*) (6th century B.C.), Greek poet, called the inventor of tragedy; hence "thespian" an actor: D-92
Thessalonians, Epistles to the, in New Testament, two of St. Paul's epistles dealing with second coming of Christ S-14
Thessalonika, or Thessalonika (ancient Thessalonica), Greece. See in Index Saloniki
Thes'saly, district in Greece, s. of Macedonia; largest division of ancient Greece: map G-164
added to modern Greece G-162
Vlachs G-164
Thetford, England, old town 75 ml. n.e. of London; Castle Hill, ancient mound 1000 ft. in circumference and 100 ft. high, dates from about 575; pop. about 4000.
Thetford Mines, Quebec, Canada, town 55 ml. s. of Quebec; pop. 10,701; extensive asbestos mines.
Thetis (*thēt'is*), in Greek mythology, mother of Achilles A-8-9
after slaying of Hector H-269
marriage feast T-142
Thiamin (vitamin B) V-310-11, 312
cooking, effect of V-311a
in bread B-282
plant growth and P-245f, V-311
Thiasal (*tē-ās'f*), a giant in Scandinavian mythology S-37-8
Thiaucourt (*tē-ō-kōr'*), France, town, site of U. S. cemetery U-225-6
Thibault (*tē-bō'*), J. A. See in Index Franco, Anatole
Thibet. See in Index Tibet
Thiel Colloge, at Greenville, Pa.; founded 1886 by United Lutheran church; arts and sciences, economics, education.
Thiers (*tē-yēr'*), Louis Adolphe (1797-1877), French statesman and historian, first president of French Republic F-188
Thless (*tēs*), Frank (born 1890), German novelist; wrote a series of books representing a 20th-century character through childhood, adolescence, youth, and maturity with changes in German social life ('The Devil's Shadow': 'Gateway to Life'; 'Farewell to Paradise').
Thigmotropism P-242
Thimble flower. See in Index Gilia
Thimmonier (*tē-mōn-yā'*), Barthélemy (1793-1857), French inventor of the sewing machine S-92
Thing, Scandinavian legislative body N-169
Thinis, or This, Egypt E-203
'Thinker, The' ('Le Penseur'), statue by Rodin R-126, picture R-125
Thinking. See also in Index Study
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grammar an aid to G-128-9
Imagination I-20
psychology P-360
reading and R-57
scientific method S-42-3
Socrates' method of teaching C-347a
Thlokol (*thl'ō-kōl*), a rubber substitute R-170
Thiosulphate of sodium, a chemical (Na₂S₂O₅·5H₂O) popularly called "hypo" S-324
"fixer" in developing photographs P-183
Thrid, in music S-198
Third Coalition N-8
Third degree, a popular term for the secret use of torture by police to extract confessions from prisoners; may consist of physical violence or of long questioning without food or sleep.

ü=French u, German ü; gom, go; thin, then; ñ=French nasal (Jean); sh=French f (s in azure); x=German guttural oh

Third Estate, in French Revolution F-200, 201
 Mirabeau leads M-197
 Third International ("Comintern"), or Communist International, organized to unite all Communists of the world; actively opposed to Second International: C-325, R-194 dissolved W-179
 Third parties, in U. S. P-293
 Third rail system S-308
 Third Republic, France F-181
 Thirteen Colonies U-233-5, A-150-75. See also in Index American Colonies
 Thirty-Nine Articles, statement of belief of members of Church of England, founded on the Forty-Two Articles compiled 1551 under Archbishop Cranmer at command of Edward VI. During reign of Elizabeth these articles were revised and reduced to 39 under Archbishop Parker.
 Thirty Thousand Islands, Georgian Bay H-363
 Thirty Tyrants, term applied to body of aristocratic Athenians appointed by Spartans to administer affairs of Athens at close of Peloponnesian War; also to band of Roman revolutionists during reigns of Valerian and Gallienus.
 Thirty Years' War (1618-48) T-80-1 causes and chief events T-80 economic effect in England A-161 Germany desolated T-80-1: origin of game, "musical chairs" P-248 Gustavus Adolphus G-189-90 political results T-81, G-72 religious settlement T-81 Richelieu R-106 rise of modern armies A-308 Treaty of Westphalia S-340
 This, or Thins, Egypt E-203
 Thisbe (*thi's'bē*), maiden loved by Pyramus in the classic tale of 'Pyramus and Thisbe' M-162
 "This Is the Way the Ladies Ride," game, picture P-256
 Thistle T-81-2 seeds S-74, 75
 Thistle, Order of the D-35
 Thistle, star. See in Index Centauroa
 Thival (*thē'vā*), or Phiva, modern name for Thebes, Greece; pop. 6000: T-77, 78 surrounding country G-163
 Thlingit. See in Index Tlingit
 Thom, Adam (1802-90), Canadian journalist and lawyer, born Scotland; came to Canada about 1832; expressed strong anti-French sentiments during Rebellion of 1837; 1839-49 Hudson's Bay Company recorder for Rupert's Land; dismissed because of unpopularity with French half-breeds.
 Thomas, Saint, one of Twelve Apostles; festival December 21: A-229
 Thomas (*tō-mā'*), Ambroise (1811-96), French composer, born Metz; best known for opera 'Mignon' Mignon O-232
 Thomas, Arthur Goring (1850-92), English composer; trained in France; distinguished as writer of dramatic compositions; beautiful, lyric melodies ('Esmeralda', 'Nadeshda', operas).
 Thomas, Augustus (1857-1934), American playwright, born St. Louis, Mo. ('The Witching Hour', 'Arizona', 'As a Man Thinks').
 Thomas, Bertram (born 1892), British explorer; financial adviser and prime minister to sultan of Oman; first European to cross Ruba-el-Khali Desert in s. Arabia ('Alarms and Excursions in Arabia', 'Arabia Felix'): A-237

Thomas, Edith Matilda (1854-1925), American poet, born Chatham, Ohio; her delicate, classical lyrics are often symbolic ('Lyrics and Sonnets', 'The Flower from the Ashes').
 Thomas, George Henry (1816-70), American general T-82 battle of Chattanooga C-157
 Thomas, Isiah (1749-1831), American printer and publisher W-145 'Goody Two-Shoes' published by L-158
 Thomas, J(ames) H(enry) (born 1875), English labor leader; began to work at age of 9; rose steadily as trade union leader; colonial secretary 1924; president International Federation Trade Unions 1920-24; lord privy seal and deputy leader of the House of Commons in charge of unemployment problem 1929; secretary of state for the Dominions 1931.
 Thomas, Jesse Burgess (1777-1853), American politician, born Hagerstown, Md.; U. S. senator from Illinois Missouri Compromise M-211
 Thomas, John Charles (born 1888?), baritone, born in Meyersdale, Pa.; sang in opera, Brussels, several seasons after 1925, Chicago 1930, Metropolitan, N. Y. commencing 1933; popular also as concert and radio singer.
 Thomas, Lowell (born 1892), American author, lecturer, traveler, and radio commentator, born Woodington, Ohio; on commission sent by Wilson to prepare historical record of World War; historian of Palestine campaign and Arabian revolution ('With Lawrence in Arabia', 'The Sea Devil', 'The Hero of Vincennes', 'Magic Dials').
 Thomas, M(artha) Carey (1857-1935), American educator and writer, born Baltimore, Md.; president Bryn Mawr College 1894-1922 ('Sir Gawayne and the Green Knight', 'Education of Women').
 Thomas, Norman (born 1884), American Socialist leader, born Marion, Ohio; pastor several Presbyterian churches in New York; founder and editor *The World To-Morrow*; Socialist candidate for governor of New York 1924; for mayor New York City 1925; for president U. S. 1928, 1932, 1940 ('The Conscientious Objector in America', 'What Is Industrial Democracy?').
 Thomas, Seth (1785-1859), American clock manufacturer; Thomaston, Conn., where his factory was located, was named for him. His son, Seth Thomas (1816-88) enlarged the factory and developed a world business: W-39
 Thomas, Theodore (1835-1905), American orchestral conductor, born Germany; organizer of the Chicago Symphony Orchestra; a strong influence in popularizing Wagner and in developing musical taste in U. S.
 Thomas a Kempis. See in Index Kempis
 Thomas Aquinas, Saint. See in Index Aquinas
 Thomas Becket, Saint (1118-70), archbishop of Canterbury B-72, C-77
 Thomas Jefferson Expansion Memorial, at St. Louis, Mo. S-10
 Thomasville, Ga., winter and health resort 81 mi. n.e. of Tallahassee, Fla., pop. 12,683; lumber products; Allen Normal and Industrial School (for Negroes).
 Thomasville, N. C., city 18 mi. s.e. of Winston-Salem; pop. 11,041; chair

factories, cotton, rayon, and silk mills.
 Thompson, Benjamin. See in Index Rumford
 Thompson, David (1770-1857), Canadian explorer, fur trader, geographer, and surveyor; first white man to follow Columbia River from source to mouth; worked on U.S.-Canadian boundary survey 1816-28; made valuable maps of n. U.S. and w. Canada Dakotas map N-165 North-West Fur Company leader F-226
 Thompson, Denman (1833-1911), American actor and playwright; toured U. S. for many years playing Joshua Whitecomb in his own play 'The Old Homestead'.
 Thompson, Dorothy (born 1894), American journalist, born Lancaster, N. Y.; columnist, New York *Herald Tribune* and New York *Post* ('Refugees', analysis of problem of modern political and racial exiles; 'Political Guide', a study of American institutions in relation to dictatorships); married Sinclair Lewis 1928, divorced 1942.
 Thompson, Ernest Seton. See in Index Seton, Ernest Thompson
 Thompson, Francis (1859-1907), English poet; educated in Roman Catholic faith, studied medicine, but failed in his examinations; suffered from poverty, ill health; wrote mystical, remote, intensely beautiful poetry ('The Hound of Heaven', magnificent religious lyric).
 Thompson, Sir John David Sparrow (1844-94), Canadian jurist and statesman; for a few weeks premier of Nova Scotia and judge of the provincial supreme court; Dominion minister of justice 1885-92, premier 1892-94.
 Thompson, (James) Maurice (1844-1901), American novelist, poet, and nature-lover, born Fairfield, Ind. ('Alice of Old Vincennes'; 'The Boy's Book of Sport') quoted B-151
 Thompson, Robert William, inventor of pneumatic tires R-166
 Thompson, Sylvia (born 1902), English author, born in Scotland; married Theodore Dunham Luling, an American artist; novels deal with young people of today ('Hounds of Spring', 'Chariot Wheels', 'Portrait by Caroline', 'Summer's Night').
 Thompson, William Boyce (1869-1930), American mine operator and banker, born Virginia City, Mont.; a director of Federal Reserve Bank, N. Y., from founding to 1919; head of American Red Cross Mission to Russia 1917; founded and endowed Boyce Thompson Institute for Plant Research.
 Thomson, Elihu (1853-1937), American inventor and electrician born Manchester, England; obtained over 700 patents; director Thomson Laboratory, General Electric Co.
 Thomson, James (1700-48), Scottish poet; best known for 'The Seasons', which in simplicity and love of nature foreshadowed the romantic period in English poetry; also wrote 'The Castle of Indolence', a long poem, and 'Rule Britannia'.
 Thomson, James, "B. V." (1834-82), British poet and journalist; profoundly melancholy and pessimistic ('The City of Dreadful Night', unique 'Itany of pessimism').
 Thomson, Sir John Arthur (1861-1933), British zoölogist, professor at University of Aberdeen; noted

for the lucid, interesting style of his scientific works; editor of 'The Outline of Science'; 'Science for a New World' quoted on hibernation H-289

Thomson, Sir Joseph John (1856-1940), English physicist E-233, picture E-232

develops electron theory A-360

Thomson, William. See in Index

Kelvin, William Thomson, Baron

Thor, in Norse mythology, god of thunder T-82-4

worshiped by early Germans G-60, 62

Thoracic cavity, the chest cavity inclosed by the ribs S-155

Thoracic duct, the main duct of the lymphatic system which carries lymph upward through the thoracic cavity and discharges it into left subclavian vein: B-157b, P-208-7

Thoracic vertebra S-155

Thorax, or chest, part of the body between head or neck and the abdomen; abdomen in mammals separated from thorax by diaphragm P-206, R-79, S-155

crab C-388

insect I-87, picture I-88

lobster L-175

spider S-258

Thoreau (thô-rô'), Henry David (1817-62), American author and naturalist T-84

first editions B-188

home in Concord C-328

nature study N-34, T-84

Thorfinn Karlsefni (thôr'fin kâr'sêf'nê), Norse navigator of the 11th century N-168

Thorium, a metallic chemical element C-177, table C-168

gas mantles contain G-23

mineral sources M-183

radioactivity R-38, 34

radio tube filaments contain E-243

Thorium-tungsten, an alloy A-133

Thorn, Jonathan, captain of the ill-fated fur-trading ship *Touquin* F-226

Thorn, Poland. See in Index

Torun

Thorn, Second Peace of (1466), between Poland and Teutonic Knights; West Prussia ceded to Poland; East Prussia became Polish fief.

Thornapple, a common name applied to several members of the hawthorn genus (*Crataegus*) of the rose family; also known locally as thorn, haw, and red or scarlet haw. All species bear hard small fruits, usually bright red, with a thin outer pulp surrounding the seeds: F-213, H-248

Thornapple, common name of genus *Datura*; includes jimson weed and angel's trumpet: P-274, picture P-273

Thornälke, Edward Lee (born 1874), American psychologist and educator, born Williamsburg, Mass.; professor of education, Teachers College, Columbia University; in his 'Animal Intelligence' showed animal action result of trial and error ('Elements of Psychology'; 'The Measurement of Intelligence'; 'The Psychology of Learning'): P-362

handwriting scale E-184

word list S-245

Thorne glacier, Antarctica A-214, 216, map A-215

Thorne-Thomson, Gudrun (born 1878), American story-teller and author ('Birch and the Star'; 'East o' the Sun and West o' the Moon') story-telling S-302-3

Thorns, reason for P-241, picture P-240

Thornton, Sir Henry Worth (1871-1933), Canadian railway executive, born Logansport, Ind.; in charge British railways in France in 1st World War; knighted 1919; president of Canadian National Railways 1922-32.

Thornton, Matthew (1714-1803), signer of Declaration of Independence; born Ireland; judge New Hampshire Supreme Court 1778-82.

Thornton, William (1762-1827), American architect

sponsors first U. S. fair F-4

Thornycroft, Sir William Hamo (1850-1925), British sculptor; work shows influence of ancient Greek art: S-61

Teucer, statue of, picture S-61

Thorold, Ontario, Canada, town 26 mi. n.w. of Buffalo, N. Y., on Welland Ship Canal; pop. 5092: W-70

Thoroughbred, a breed of horses developed in England for racing H-343-4

Thoroughwort. See in Index

Boneset

Thorvald Nilsen, Mount, Antarctica, on the Polar Plateau, s. of the Ross Shelf Ice and about 260 mi. from the South Pole; highest known mountain on Antarctic Continent, 15,400 ft. high.

Thorvaldsen (thôr'vâld-sên), Bertel (1770-1844), Danish sculptor T-84-5

Achilles and Priam, picture A-8

Andersen and L-160

bas-relief, picture A-8

Copenhagen museum T-85

Hector and Paris, picture H-268

'Lion of Lucerne' T-85

portrait-statue, picture D-51

Toth (tôt or tóth), Egyptian god of wisdom and letters; identified by the Greeks with Hermes; symbol is ibis, bird sacred to him.

Thothmes III (thô'tmês or thôth'mês). See in Index

Thutmose III

Thou (tô), Jacques Auguste de (1553-1617), French historian and statesman; famous for his 'Historia sui Temporis' (in Latin), a history of his own times; collected large historical library

book collecting B-188

'Thousand and One Nights', or 'Arabian Nights' A-243-5

Baghdad scene of B-14

Thousand Islands, group of about 1500 islands in St. Lawrence River, at outlet of Lake Ontario, near Kingston, Ont., Canada; some belong to Canada, some to New York State; popular summer resort region: S-8, map N-114

Thousand Islands International Bridge, across the St. Lawrence River S-8, table B-342

Thousand legs, or millipede, a many-legged arthropod.

Thrace, also Thrake, region in e. of Balkan Peninsula varying in extent at different periods; held by Turkey from 1458 to 1878 when n. part, by Treaty of Berlin, was placed under separate administration as Eastern Rumelia, later a part of Bulgaria; scene of heavy fighting in 1st World War: maps B-18, G-154

Greece and Turkey in G-162

part seized by Bulgaria B-271

Thrale, Mrs. Hester (1741-1821), English woman, wife of Henry Thrale, a brewer; after his death married an Italian muselman named Plozzi; wrote delightful letters and was central figure of a charming literary and artistic circle

friend of Dr. Johnson J-225

Thrasher, an American thrush T-85

Thraupidae, a bird family B-132

Thread T-85-6

mercized M-118-19

sewing, selecting for S-91

slit S-148

spinning C-378, pictures C-377

Threadfish, a fish (*Polynemidae*)

allied to the mullet but distinguished by slender threadlike rays proceeding from the pectoral fin, and sometimes longer than the body. Name also applied to cobbler fish. See in Index

Cobbler fish

Threadneedle Street, London L-185

Threadworm W-180b

Three-dimension film, depth in motion-picture photography M-280

Three Fates, in Greek mythology F-18

'Three Fates, The', sculpture from Parthenon, picture G-161

Three-field system of agriculture, picture A-59

Three-finger rule, in electromagnetic induction E-229

'Three Graces', painting by Sargent, picture P-29

Three-horned beetle, picture B-81

Three Kings of Cologne C-304. See also in Index

Mag1

Three-mile limit, in international law I-109

'Three Musketeers, The', novel by Dumas D-119-20

Three Petticoats, League of S-84

Three-phase alternator, an electric alternating-current generator E-218

Three-quarter nelson, in wrestling, picture W-182

Three Rivers (French *Trois Rivières*), Quebec, Canada, port on St. Lawrence and St. Maurice rivers; pop. 35,450; exports lumber, grain, cattle, lumber, cotton, paper, and pulp industries; founded 1634; surrendered to Americans 1775; taken by the British following year: map C-50c

fur trade F-223-4

Three-spot, a fish, color plate A-233a-b

Three-toed woodpecker, foot, picture B-129

Thresher, or fox shark S-103, picture F-72

Threshing T-88

harvester-thresher T-88, A-40, picture A-55

primitive methods T-88, pictures A-58, E-196, T-90

rice in Japan R-101, picture R-102

Threshold of sensation S-77

Thrift T-86-8

advertising may encourage waste A-23

Thrift, a common name for 2 species of plants. See *Asperula*; Sea pink

Thrifty Week (Jan. 17-24) H-320, T-88

Thrips, small insects of the order *Thysanoptera*, in some respects resembling aphids; feed on plant juices; some species injurious

spraying kills S-262

Throat

larynx and vocal chords V-330-1

windpipe, or trachea L-219

Throatwort, a genus of perennials (*Trachelium*) of bellflower family, native to Mediterranean. Grows to 8 ft.; leaves oval; flowers blue, star-like, tubular, in clusters at ends of branches.

Thrombokinas (thrôm-bô-kîn'âs), blood-clotting substance B-157a

Throwing, in pottery making P-328, pictures P-327

Throwing, in silk manufacture S-148

ü=French u, German ü; gem, go; thin, then; ã=French nasal (Jean); sh=French j (s in azure); k=German guttural oh

Thrams, village described in Barrie's writings B-51

Thrush, mimic T-85, M-213

Thrush family of birds T-88

Thrust, in architecture A-249

Thucydides (*thū-sīd'ī-dēs*) (about 471-396 B.C.), Greek historian, greatest of antiquity G-173

Pericles' funeral oration P-126

Thugs, an organization of professional murderers in India who strangled their victims in honor of the goddess Kali, wife of Siva; killed 30,000 natives a year; suppressed by British government 1840.

Thule (*thū'lē*). See in Index Ultima Thulo

Thulium, a chemical element, *table* C-168

Thumb H-207, *pictures* A-225, H-208 monkey's M-227, 229

Thumb Bible B-105

Thun (*ign*), a town of Switzerland 17 mi. s.e. of Bern, near Lake of Thun; pop. 16,500; feudal castle about 700 yrs. old; military headquarters; popular tourist resort: *map* S-351

Thun (*ign*), Lake of, lake in canton of Bern, Switzerland, w. of Inter-laken, an expansion of Aar River, 10 mi. long by 2 mi. wide.

Thunbergia (*thūn-bēr'jī-ā*), a genus of perennial twining climbers of the acanthus family, found in tropical regions. Leaves usually triangular; flowers funnel-shaped with 5 lobes, blue, purple, yellow, or white, solitary or in loose clusters. Black-eyed Susan vine (*T. alata*) has flowers, creamy with dark purple throat; sometimes called clock-vine.

Thunder L-134

cloud C-281, *picture* S-298

distance, timing of S-195

Thor, god of T-82-4

Thunder-bird, in mythology of North American Indians I-64

Thundercloud C-281, *picture* S-298

Thunder-pumper, a name given to the bitter B-151, *pictures* B-151, B-128, 131

nest, *picture* N-33

protective coloration, *picture* B-131

Thunder showers S-298

hall factory H-195

tropics R-46

Thurber, James (born 1894), writer and illustrator, born Columbus, Ohio; on staff of *New Yorker* magazine; known for humorous drawings and stories ('The Seal in the Bedroom'; 'My Life and Hard Times'; 'Fables for Our Time, and Famous Poems Illustrated').

Thuringia (*thū-rin'gī-ā*), German Thüringen, state in central Germany formed 1919 by union of former states of Saxe-Weimar-Eisenach, Saxe-Meiningen, Gotha, Saxe-Altenburg, Reuss, Schwarzburg-Rudolstadt, Schwarzburg-Sondershausen; 4587 sq. mi.; pop. 1,600,000; *map* G-66

Weimar W-69-70

Thuringian Forest, also Thüringer Wald, range of hills in Germany from Werra River near Eisenach s.e. to Bavarian frontier; magnificent pine forest: *map* G-86

Thursday, 5th day of week; named for Thor, Norse god of thunder.

Thursday Island, Australia, in Torres Strait, off n. point of Queensland; fine harbor; pearl and trepang fishing; pop. about 1000.

Thurston, Howard (1869-1986), American magician, born Columbus, Ohio; toured U. S. 28 seasons;

invented and made much equipment in laboratory workshop: M-32d, *picture* M-32c

Thurston, Lorrin Andrews (1858-1931), lawyer and statesman, born Hawaii; son of American missionaries; held various government positions in Hawaiian monarchy and republic, and was active in furthering annexation to U. S.

Thutmose III, or Tethmosis III (1501-1447 B.C.), greatest conqueror among Egyptian pharaohs; through his conquests brought Egypt to pinnacle of prosperity; conquered Syria, Palestine, and part of Mesopotamia; built and improved many temples; succeeded Queen Hatshepsut: E-209

obelisk, *picture* T-162

Thwaites (*thwōits*), Reuben Gold (1853-1913), American historian, born Dorchester, Mass.; managing editor *Wisconsin State Journal*; secretary and superintendent State Historical Society, Wisconsin; edited 'The Jesuit Relations', 73 volumes; wrote historical books.

Thwing, Charles Franklin (1853-1937), American educator, born New Sharon, Me.; president Western Reserve University 1890-1921; author of many books and articles on education.

Thyestes (*thī-ēs'tēz*). See in Index Atreus; Aegisthus

Thylacine (*thī'lā-sin*), Tasmanian, or zebra wolf, a striped carnivorous marsupial of Australia T-15, *picture* T-15

Thyme (*tim*), a genus (*Thymus*) of woody perennial plants of the mint family native chiefly to the Mediterranean region; leaves small, sometimes gray and hairy; stem erect or creeping; flowers tiny, purple, rose, or white, growing whorled in spikes. Common thyme, a garden herb, is *Thymus vulgaris*; mother-of-thyme, or creeping thyme, is *Thymus serpyllum*: C-41, S-251

Thymol, a white, crystalline, aromatic, organic compound, $C_{10}H_{14}O$; obtained by distillation of thyme oil; used as an antiseptic.

Thymus (*thī'mūs*) gland, ductless gland in neck below thyroid and extending down between the lungs; reaches maximum growth at about second year, remaining until about 15th year when it begins to disappear. In rare cases it persists in an adult who is then subject to sudden and perhaps fatal nervous shock.

Thyratron, a type of vacuum tube E-243

Thyroid cartilage of throat V-330-1, *picture* L-219

Thyroid gland G-99

basal metabolism R-80, B-118-19

Thyroxin, secretion of the thyroid gland G-99

Thyrsls (*thēr'sis*), poetic name for a shepherd or rustic lad, first used by Theocritus; title of a poem by Matthew Arnold in memory of Arthur Hugh Clough.

Thysanoptera, an order of minute insects consisting of the thrips; winged species have four wings.

Thysanura, an order of wingless insects consisting of the bristle-tails.

Thyssen (*tēs'en*), or Tyssen, August (1842-1923), German industrialist; had coal and iron mines, steel mills, railroads, and steamship lines all over world; called 'king of Ruhr'; succeeded by son Fritz Thyssen.

Ti (*tē*), a shrub (*Taetia terminalis*)

of the Illy family, native to the Pacific islands: H-244

Tiahuanaco (*tē-ā-wā-nū'kō*), village in Bolivia 88 mi. n.w. of La Paz ruins B-189

Tia Juana (*tē'ā hwū'nū*). See in Index Tijuana

Tian Shan. See in Index Tion Shan

Tibbett, Lawrence (born 1896), barytone, born Bakersfield, Calif.; debut in concert 1917, in opera 1923; starred in motion pictures and radio programs.

Tib'bu, or Tēbu, a nomadic people of the Sahara S-5

Tiber, famous river of central Italy T-88, *map* I-156

at Rome R-144, R-128

story, 'How Horatius Kept the Bridge' T-88-9

Tiberias (*tī-bēr'i-ās*), town in Palestine on w. shore of Sea of Galilee, n.e. of Nazareth; pop. 10,000: P-35 ancient school of rabbis B-104

Tiberias, Sea of. See in Index Galilee

Tiberius (*tī-bēr'i-ūs*), Claudius Nero (42 B.C.-37 A.D.), second Roman emperor; made consul 13 B.C. and tribune 6 B.C.; adopted by Augustus 4 A.D.; led campaigns in Germany; became emperor 14 A.D.

palaces on Capri N-4

Tibet', or Thibet, country in central Asia, nominally a Chinese dependency; 463,000 sq. mi.; pop. about 2,000,000; cap. Lhasa: T-89-90, A-324, *maps* A-332a, b-c, C-211

Buddha's shrine, *picture* A-329

butter ('ghee') B-282

climate T-89; rainfall H-292

history T-90

marriage customs F-8

natural features T-89; Mt. Everest, E-339-40, *pictures* A-333, E-343

products T-89-90

religion T-90

tea drinking T-21, 26

yaks Y-203, *pictures* A-326, E-343,

T-90, Y-203

Tibia, the inner bone of the leg below the knee S-156, *picture* S-156

Tibullus (*tī-bū'lūs*), Albius (54?-19 B.C.), Roman poet L-69

Tical', the former monetary unit of Siam, worth when used about 44 cents in U. S. money; replaced in 1923 by baht. Also a weight, .36 lb.

Tielno (*tē'chē-nō*), canton in s. Switzerland; 1086 sq. mi.; pop. 160,000 language S-351

Tielno River, in Switzerland and Italy, 150 mi. long; flows into Po: S-350

Ticinum (*tē-chē'nūm*), ancient name of Pavia, Italy. See in Index Pavia

Tick, the largest of the blood-sucking arachnid mites; term also applied to various parasitic insects

fever tick parasite C-107; tick preyed on by plover P-259

insects distinguished I-37

life history S-258

spiders distinguished S-258

tick fever, or Texas fever C-107

Tioh, sheep, a blood-sucking fly F-129, *picture* P-69

Ticker, for printing quotations and news on tape by telegraph. A modern ticker contains a rotating wheel and a moving tape, which is pressed by magnetic apparatus against any character desired on the wheel as incoming electric current impulses may direct. Current impulses are controlled by apparatus similar to that for modern multiplex telegraphy. The earliest was invented (1867) by Edward A. Calahan; the present type is a combination of many ideas and inventions: *pictures* T-33, E-160

Key—cāpe, āt, fār, fōst, what, fāll; mō, yēt, fērn, thēre; ice, bīt; rōw, wōn, fōr, nōt, dō; cūre, bāt, ryde, fūll, bārn;

Edison invented early type E-159 multiplex telegraphy operating principle T-34

Tick fever, or Texas fever, an infectious disease of cattle C-107

Ticking, strong twilled cotton fabric with colored stripes; used as covering for pillows and mattresses.

Tickler coil, in radio R-22, *diagram* R-21

Ticknor, George (1791-1871), American critic and historian, born Boston, Mass.; while professor of modern languages at Harvard he inaugurated present American University system, among first to propose elective system; his 'History of Spanish Literature' ranked as standard work even in Spanish countries.

Ticked. *See in Index* Coreopsis

Ticonderoga (*tī-kōn-dēr-ō-gō*), N. Y., village on outlet from Lake George to Lake Champlain, 85 mi. n.e. of Albany; pop. 8402; *map* N-80. *See in Index* Fort Ticonderoga

Tidal bore T-91, *picture* T-02

Hangchow, China II-210

Tide T-90-2

direct, and opposite T-91

double at Southampton S-212

Gulf of Mexico G-184

harbors helped by E-316, M-255

high, and low T-91

Mediterranean E-316

moon causes T-90-1, M-255

motor W-52

mythology, *picture* A-311

neap tides T-91

power source T-92, P-339

predicting machine C-19, *picture* A-385

Ross Sea, Antarctica, effect A-214

sanitary effect M-255

spring tides T-91

tidal waves, or bores T-91: Bay of Fundy T-01, *picture* T-92; Hangchow H-210

Tidewater region

life and customs A-164

Maryland M-78

Virginia V-303

Tidore (*tē-dōr*), Netherlands Indies, small island in Molucca group, s. of Ternate; 42 sq. mi.; pop. 17,000

Magellan's crew at, *picture* E-131

Tie, in music M-319

Tieck (*tēk*), Ludwig (1773-1853), German novelist, translator and critic; one of leaders of romantic movement ('Abdallah'; 'William Lovell').

Tien Shan (*tē-ēn' shūn*), mountain range in cent. Asia; rises in the Pamir Plateau; extends n.e. and divides Kirghiz S.S.R. and Sinkiang province, China; *map* C-211

Tientsin (*tin'tsin*), seaport in n. China; pop. 1,000,000; T-92, *maps* A-332b, C-212

Tientsin Treaty (1858), ended war between China and France and England C-221j

Tlepolo (*tē-ā'pō-lō*), Giovanni Battista (1692-1769), Venetian artist; greatly influenced by Paul Veronese; executed many decorations for churches and palaces, easel paintings, and etchings.

Three (*tōrs*), a canonical hour M-233, 234

Tierra del Fuego (*tē-yēr'rd dēl fē-ā'gō*), archipelago at s. extremity of South America; name means 'land of fire': S-208h, l, A-280a; C-206, 207b, *maps* A-279, C-206, S-208c, d

people S-206, 208c, C-207c, *picture* S-205f

Tierra fria (*frē'ū*) ('cold land'), Mexico M-134

Ties, railroad C-420, *picture* R-41

creosote treatment C-394

Tietjens, Eunice (born 1884), poet and author, born Chicago; books for adults: 'Leaves in Windy Weather', poetry; 'World at My Shoulder', autobiography; for children: 'Boy of the Desert', 'Boy of the South Seas'.

Tiffany, Charles Lewis (1812-1902), American jewelry merchant, born Killingly, Conn.; came to New York in 1837 and established fancy goods and stationery store with partner on borrowed capital of \$1000; gradually concentrated on jewelry, building up one of foremost houses of world.

Tiffany, Louis Comfort (1848-1933), American artist, born New York City; son of above; trained in law, but devoted himself to art, especially to work with glass, inventing Tiffany favril glass; director Tiffany Studios, vice-president and trustee, Tiffany & Co.

Tiffany, famous diamond, *picture* D-63

Tiffin, Ohio, industrial center of farming, clay, and glass-sand region, on Sandusky River, 80 mi. n. of Columbus; pop. 16,102; Heidelberg College; *map* O-210

Tiflis (*tēf-tēs'*) (native Tbilisi), Georgia, U. S. S. R., capital of republic at s. base of Caucasus Mts., midway between Black and Caspian seas; distributing center for Transcaucasia; pop. 520,000; G-59, *map* E-326e

railroad connections C-116

Tiger T-92-3, *picture* T-93

cat family characteristics C-95-6

foot, *picture* F-147

hunting, with elephant E-249-50

Tiger, saber-toothed. *See in Index* Saber-toothed tiger

"Tiger, the" (Clemenceau) C-262

Tiger-beetle B-82, *pictures* B-81, B-84, I-82

foot, *picture* F-147

scientific name B-35

"Tiger cat," fur. *See in Index* Serval

Tiger cowry, a mollusk, *picture* S-109

Tiger lily L-137

pollen grain, *picture* F-125

Tiger-moth, caterpillar C-99

"Tiger of the air," horned owl O-257

Tiger salamander S-12, 13

Tiger's eye, a quartz from South Africa colored light brown, bluish, or red with a satiny sheen; used as gem stone.

Tiger shark, large species of the gray shark (*Carcharidae*) family, found in nearly all warm seas; named for tiger-like stripes which in adult stage turn to uniform dark gray color.

Tiger swallow-tail, butterfly. *See in Index* Swallow-tail

Tiger top, a mollusk, *picture* S-109

Tight-rope walker

why he does not fall G-143

Tiglath-Pileser I, reigned about 1120-1105 B.C., one of greatest Assyrian conquerors and builders; claimed to have conquered 43 countries.

Tiglath-Pileser III or IV, king of Assyria 745-727 B.C.; known earlier as Pul or Pul; great administrator and soldier; led campaign in Syria 738 B.C.; assisted Ahaz, king of Judah, by defeating Pekah of Israel and Rezon of Damascus; captured Damascus and Samaria.

Tigranes (*tī-grā'nēs*) (ruled 96?-55? B.C.), powerful king of Armenia; defeated by Lucullus 69 B.C. but continued resistance to Rome;

finally surrendered to Pompey, 66 B.C., afterward ruling as a Roman vassal.

Tigridia (*tī-grid'i-ā*), or tiger-flower, a genus of perennial plants of the iris family, found from Mexico to Chile. Bulb roots; leaves narrow; flowers red-spotted with yellow and purple, or pure yellow, with a spathe (leaf surrounding flowers) 6 in. across; also called Mexican shell flower.

Tigris, great river of w. Asia, flowing 1150 mi. to Persian Gulf T-93, *maps* A-242, B-8

basket boats B-105, *picture* B-182

Euphrates, sister stream E-315

Mesopotamia M-120-1

tower of Samarra, *picture* M-121

Tigua, a division of the Tanoan linguistic family of Indians living in the pueblos of Taos, Picuris, Sandia, and Isleta, in the Rio Grande Valley, New Mexico.

Tihwa, China. *See in Index* Urunchi

Tijuana (*tē-hwā'nā*), or Tia Juana, resort city in Lower California, Mexico, 16 mi. s. of San Diego, Calif.; resident pop. 7500; C-35, *map* M-133

Tikki-Tikki, or Akka, a tribe of Negroid pigmies of Africa living chiefly in the Congo State.

Tilburg, Netherlands, manufacturing town 38 mi. s.e. of Rotterdam; pop. 79,000; textiles, tanned leather, iron products; *map* B-87

Tilden, Samuel J. (1814-86), American statesman, born Lebanon, N. Y.; governor of New York, 1874 breaks "Twisted Ring" of New York N-122

Hayes-Tilden election H-250-1

Tile B-239, *pictures* B-267, C-260. *See also in Index* Pottery

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hollow tile for building B-284

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roofs J-197, *picture* C-280

Spanish "azulejos" V-269

terra cotta B-284, *picture* B-285

uses B-239, *pictures* B-267, C-260

Tilefish F-75

Tillaceae (*tīl-ā'sē-ē*). *See in Index* Linden family

Till, claylike sedimentary material deposited by glaciers M-184

Tiller, of ship S-118

Tilley, Sir Samuel Leonard (1818-96), Canadian statesman, introduced Canadian protective tariff.

Tillman, Benjamin Ryan (1847-1918), American politician, born Edgefield County, S. C.; leader South Carolina Democrats; elected governor 1890, re-elected 1892; elected to U. S. Senate 1894, 1900, 1906, 1912; promoted industrial and technical education in South Carolina.

Tilly, Johann Tserklaes, Count of (1559-1632), commanding general of Catholic League in Thirty Years' War T-80, G-190

annual play at Rothenburg G-69

Tilst (*tīl'sit*), manufacturing and commercial city in e. Prussia on Niemen, or Memel, River; pop. 57,000; captured by Russians in 1st World War; *map* G-66

Tilst, peace of (1807) N-10

Tilth, in agriculture S-191a

"Tilting with windmills" C-138

Timarau (*tē-mā-rā'g*), sturdy dwarf buffalo of Mindanao, P. I.

Timber L-212-19. *See also in Index* Lumber and timber

Timber line, the line on mountains and highlands above which trees

do not grow; varies according to latitude, local climatic conditions, and soil; in Rockies from 9000 to 12,000 ft., in Alps 6400 ft., in Himalayas 11,800 ft.: *photograph* E-145d

Timberman beetle, *picture* B-81

Timber wolf, or gray wolf W-128, 129

enemy of bison B-150

Timbre, in human voice V-331

Timbrel, ancient Hebrew instrument resembling the tambourine.

Timbuktu (*tīm-būkt'ū*), or Tombouctou, French West Africa, trading post in French Sudan on s. edge of Sahara desert, 9 mi. n. of Niger River; pop. 7000; large caravan and river trade; founded in 11th century, it is so remote and inaccessible that it was little known to outside world until late in 19th century: *map* A-42a

Niger River trade S-317

Timby, Theodore Ruggles (1819-1909), American inventor, born Dutchess Co., N. Y.; invented revolving turret, used in the construction of the *Monitor*.

Time T-94-6

astrolabe determines N-49-50

calendars C-21-4

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international date line T-95, *maps*

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observatory signals O-193

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radio signals U-226, O-193

ship's time T-95-6

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solar, mean and apparent D-21, T-94:

solar month M-249

standard zones T-94, *diagrams* T-95,

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stars measure A-346, 344, T-96, D-21,

picture A-341

sun dials W-35, *pictures* W-38

water clock W-35, *picture* W-37

Time, the Value of, a Little Talk by

Arthur Mee T-97

Time deposit, in a bank B-39-40

Time fuses, in artillery A-320

Time loans, in banking B-41

Time lock L-177

bank vault, *picture* B-41

Thbenhor, Egypt. See Damanhur

Time-signature, in music. See in *Index*

Signatures, in music

"Times that try men's souls" P-12

Time zones (U.S.) T-94, *diagrams*

T-95, 96, *map* U-198b

Timing gear, automobile A-398, *pictures*

A-398, 398

Timisoara (*tē-mīsh-wā'rā*), Rumania,

also Temesvar, city 75 mi. n.e.

of Belgrade (Beograd); pop. 91,000;

tobacco, textiles, paper, leather; has

suffered many sieges: *map* E-326e

Timni, or Temne, Negro people of

Sierre Leone, w. Africa.

Timon of Athens, famous misanthrope,

living during Peloponnesian War; at first rich and generous,

later soured by abandonment of

friends when fortune failed him;

subject of Shakespeare's *Timon of Athens*.

Timor (*tē-mōr'*), island of Malay

Archipelago, n. of Australia, east-

ernmost and largest of Lesser Soenda

Islands; about 13,700 sq. mi.;

n.e. half (pop. 460,000) belongs to

Portugal, s.w. half (pop. 370,000) to Netherlands: *map* A-332c

Timor Sea, shallow sea, 350 mi. wide, between northern Australia and Timor; most of sea not over 600 ft. deep, but in Moore Trench, near Timor, reaches a depth of over 10,100 ft.: *map* A-372a

Timoshenko, Semyon (born 1895), Russian general; commander in Bolshevik cavalry 1917-20; Commissar of Defense 1940; commanded Moscow front to Oct. 1941; put in command of Soviet army operations on European front Dec. 1941.

Timothy, or Timotheus, disciple and assistant of St. Paul (Acts xvi, 1, xvii, 14) who addressed to him the two epistles Timothy I and II; commemorated as saint in Greek church Jan. 22, in Roman Jan. 24.

Timothy, a cultivated grass (*Phleum pratense*) native to Europe where it is called cat's-tail grass; has an erect, slender stem topped by a cylindrical spike of flowers

origin of name A-53

Tim'pani, or kettle-drums D-114, *picture*

M-322

Timpanogosa Cave, national monument

in Utah N-22d

Tim'rod, Henry (1829-67), poet, born

Charleston, S. C.; "laureate of Con-

federacy" ('Charleston')

'Spring', quoted A-179

Timucua (*tē-mū-kū'ā*), a linguistic stock of Indians, consisting of many tribes occupying the Florida peninsula in the 18th century, but now extinct.

Timur (*tē-mūr'*) Leng, or Tamerlane,

"Timur the Lame" (1336-1405),

Mongol conqueror whose short-

lived empire stretched from n. India

to Asia Minor M-223-4

Afghanistan invaded A-31

checks Turks at Ankara T-162

Damascus D-9

India I-38

Samarkand T-158

Tin, a metallic chemical element T-98,

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alloys A-132, T-98: britannia metal

A-222; bronze B-249

cans C-74, T-98

electrochemical activity E-239

enameled earthenware P-331

fireproof cloth contains F-59

melting point, *table* F-194

mining: Bolivia, *picture* L-67n;

panning tin in Malay, *picture*

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ores T-98, M-182, production of

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Phoenicians seek in England T-98,

E-289

pins contain P-219

producing regions T-98: Bolivia

B-170; Cornwall, England T-98;

Malay States T-98

tinware, American peddlers C-335

wartime scarcity, U. S. N-12d

weight I-134

"weighted" silks contain S-150

Tincol (*tīng-kūl*), mineral yielding

borax B-192

Tincture, in pharmacy, a solution of a

medicine in alcohol or ether.

Tinctures, in heraldry H-281

Tindale, William. See Tyndale

Tinder, starting a fire C-47, 47a

Tinder box M-86, *picture* M-87

Tinfoil, thin sheets of tin or of tin

and lead.

Tinker, Clarence L. (1887-1942?),

army officer, Osage Indian, born

Edgtn, Kan.; made commander of

U. S. Army Air Forces in Hawaii

Dec. 1941; in Philippine Islands and

Hawaii 1912-17; later chief of

Third Interceptor Command at

Drew Field, Fla.

Tinneh (*tīn'ē*), or Déné (*dā-nā'*), name of northern division of Athapaskan Indians. See in *Index* Athapaskan

Tinsel, historically, a fabric interwoven with shiny threads of gold, silver, or other metal; commonly, thin shiny threads or strips of inexpensive metallic material, producing glittering appearance.

Tinstone, an ore T-98

Tit, in color C-308d, e, color chart C-308c

Tintagel (*tīn'tāg'ēl*), or Trevena (*trēv-ē'nā*), village in Cornwall, England; legendary birthplace of King Arthur: S-303f-g

Tintern Abbey, ruins of beautiful Cistercian monastery in Monmouthshire, England on river Wye; abbey founded 1131; existing church built in 13th century.

Tintoretto (*tēn-tō-rēt'tō*), "little dyer," popular name, from his father's trade, of the great Venetian painter Jacopo Robusti (1518-94); master of technique and color and excellent portraitist; was dismissed from the studio of Titian, his first teacher ('Calvary'; 'Bacchus and Ariadne'); P-16

Tiny Tim, in Dickens' 'Christmas Carol', crippled son of Bob Cratchit.

Tippecanoe (*tīp-ē-kā-nō'*), small river in n. Indiana; flows s.w. 200 mi. to Wabash River; *map* I-46

Tippecanoe, battle of H-232, I-46-7,

T-28

British W-9

"Tippecanoe and Tyler too," political

slogan P-292, H-232

Tipperary, agricultural county in

Monster Province, s. Ireland;

divided into North and South Rid-

ings; 1643 sq. mi.; pop. 138,000;

also name of town in county (pop.

about 6000): *map* E-270a

Tipping, hotel and pullman E-313

Tipple house, of coal mine, *picture*

C-287

Tippu Sahib (*tē-pū' sū'hīb*) (1757?-

99), Indian potentate, son of Hyder

Ali, whom he succeeded as sultan

of Mysore 1782; fought British in-

vasion but defeated and slain in his

capital of Seringapatam.

Tirach Mir (*tē'rūch mēr*), highest peak

of Hindu Kush Mts., in Northwest

Frontier Province, India; 25,400 ft.

Tirana (*tē-rā'nā*), also Tiranë, capital

of Albania since 1921; pop. 80,000;

18 mi. e. of Durazzo: *map* E-328d-e

Tirawa, Pawnee Indian name for

mystic powers of life I-64

Tirc, rubber R-168-7, A-95, *pictures*

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cushion R-187

freezing, wartime, in U. S. N-12n

retreading R-167

solid rubber R-167

strengthened by carbon black G-24

tested by X-rays X-201

Tree, or Tyree, island, Hebrides

H-267

Tridantes (238-314), king of the Ar-

menians A-301-2

Trnova (*tēr'nō-vā*), Bulgaria (native

Trnova), industrial city 120 mi. n.e.

of Sofia; pop. 13,000; capital of

Bulgaria in Middle Ages: *map* B-18

Tirol. See in *Index* Tyrol

Tir'pitz (*tīr'pīts*), Alfred von (1849-

1930), German statesman; navy

secretary 1897-1918; lord high ad-

miral 1911-18; created powerful

German navy; advocated ruthless

submarine warfare in 1st World

War; resigned 1918 after break with

William II.

Tirso de Molina. See Tellez, Gabriel

Tirso River, Sardinia, about 94 mi. long; flows s.w. into Gulf of Oristano on w. coast.

Tiryns (*tí'rin*), Greece, city in Argolis; destroyed 468 B.C.

Tiryas (*tí'rias*), Greece, city in Argolis; excavations S-40, A-26, 27, map A-25

Tishri (*tish'ri*), or **Tiari** (*tis'ri*), first month in Jewish calendar N-113

Tisiphone (*tí-sif'ō-nē*), in Greek mythology one of the Furies F-213

Tisquan'tum, Indian chief. See in *Index* Squanto

Tisri. See in *Index* Tishri

Tissot (*tē-sōt*), James Joseph Jacques (1836-1902), French painter and illustrator; 'Life of Christ', series portraying with minute realism scenes of Palestine.

Tissue, of animals composed of cells C-122 connective (bone, cartilage, and ligaments) B-172, S-156 epithelial (skin, mucous, and glandular) S-156-7 fats and oils in F-18 muscular M-304-5 radiation affects R-15 water in W-42

Tissue, of plants P-238 composed of cells C-122 trees T-130, 181, picture T-131

Tissue paper P-57, 61

Tisza (*tē'sā*), Stephen, Count (1861-1918), Hungarian statesman, premier at outbreak of 1st World War; son of Count Koloman Tisza (1830-1902), one of chief builders of Hungarian monarchy.

Tisza River. See in *Index* Theiss

Titania (*tī-tā'nī-d*), in English folklore, queen of the fairies, wife of Oberon

'Midsommer Nights' Dream' M-162

'Titanic', large steamship sunk on maiden voyage after striking underwater shelf of iceberg I-4

Titanium, a metallic chemical element, C-175, table C-168 alloys purified by A-133 in earth's crust, diagram C-167 ores P-32, M-182 oxide: colors synthetic sapphires G-26; in paints P-32

Titanox C-177

Titans, in Greek mythology, rebellious giant children of Uranus U-261, Z-216 Prometheus, a Titan P-351

Titchener, Edward Bradford (1867-1927), American educator and psychologist, born in England; professor psychology Cornell for 35 years and there developed to high degree experimental laboratory ('Experimental Psychology'; 'Text Book of Psychology').

Tithe, tax of one-tenth, usually on land; levied, especially for religious purposes, from ancient times; survived in England until 1936 in feudal system, stone for measuring, picture F-30

Tithonia (*tī-thō'nī-d*), or Mexican sunflower, a genus of perennial plants and shrubs of the composite family, native to Central America. Grow 6 to 30 ft.; leaves oval or triangular, and lobed; flower heads orange-yellow.

Tithonus (*tī-thō'nūs*), in Greek mythology mortal husband of the goddess Aurora (Eos), the Dawn A-365

Titian (*tish'ān*), or **Tiziano Vecellio** (*tēt-sē-ū'nō vā-ohē'lē-ō*) (1477-1576), Italian painter T-98-9 'Assumption of the Madonna', picture T-99 paintings in Prado National Museum, picture M-23 Philip II, picture P-163

Titicaca (*tē-tē-kā'kā*), Lake, largest lake of South America, between Peru and Bolivia; 130 mi. by 30 mi.: B-169, map S-208b, pictures B-168, P-138

Titlark, or **pipit** T-99, color plate B-139

Title, in law, the right to ownership of property; the sum total of legally recognized rights to property. The owner may transfer many of these rights without losing title.

Title-page, origin of B-181

Titles of nobility D-32, 34-5 address, form of D-34-5 American colonies A-166 differences in England and continental Europe D-34 inheritance D-34, 35 orders of knighthood D-35 rank in Great Britain D-34 reversion to the king D-34 United States: forbidden by Constitution U-214; naturalized citizens drop titles D-34 women D-35

Titmarsh, Michael Angelo, pen name of Thackeray T-72

Titmouse, bird family T-99-100

'Tito' (*tē'tō*) (Josip Brozovich), a Croatian, leader of "Partisans," Yugoslav guerrillas; a metal worker and a labor leader before 2d World War: W-179f

Titration, a process in chemistry C-174, A-10

Titus, Greek disciple and companion of the Apostle Paul (Gal. ii, 1, 3) who addressed an epistle to him.

Titus, Flavius Sabinus Vespasianus (40?-81 A.D.), Roman emperor; succeeded his father Vespasian 79 A.D.; humane and able ruler captures Jerusalem J-217 dedicates Colosseum R-138 gladiatorial show G-96 triumphal arch R-143, pictures R-139, I-162

Titusville, Pa., city 42 mi. s.e. of Erie; pop. 8126; iron, steel, oil well supplies, machinery, cutlery, silk; natural gas, oil; first successful artesian oil well in U. S. drilled here August 1859; map P-112 pioneer user of natural gas G-23

Tivoli (*tē'vō-lō*), Italy, picturesque walled town 18 mi. n.o. of Rome at falls of River Anio; pop. 15,000; many antiquities; ancient Tibur, favorite resort of Romans ruins of Hadrian's villa, picture I-171

Tiw, or **Tyr**, Teutonic god of war; gave name to Tuesday.

Tijaratap, Java (pop. 28,000) J-205

Tlaxcala (*tāks-kā'lā*), Mexico, state in s.e.; 1555 sq. mi.; pop. 205,000; cap. Tlaxcala banners F-100, color plate F-90

Tlaxcalans, Indians formerly occupying state of Tlaxcala, Mexico Cortez conquers C-372, 373

Tlemcen (*tēm-sēn'*), Algeria, trading town near frontier of Morocco; pop. 52,000; former center of Moorish art and culture; map A-127

Tlingit (*tlīng'gī*), or **Tlinkit**, group of North American Indian tribes living on n.w. coast between lat. 54° 40' and 60° 1-56, A-103

TNT, or trinitrotoluene, a high explosive E-348 used in torpedoes or mines T-113, picture T-114

Toad T-100-1 economic value of T-100 eye, picture E-351 frog differentiated from T-100 length of life, average, pictograph A-198 reproduction of T-101

tongue structure T-107, picture T-101

warts not caused by W-11

Toadfish, a family of robust-bodied fish (*Batrachoididae*), with large head and mouth, the latter filled with strong teeth. Nearly all species are American, and all are carnivorous, voracious, and without value as food.

Toad-flux. See Butter-and-eggs

Toadstool, a variety of fungi with an umbrella-shaped cap; term popularly applied to poisonous varieties of mushrooms; name originated in fairy lore.

Toaster, colonial, picture A-173

Toaster, electrical, picture E-238

Tobacco T-102-4. See also in *Index* Pipe, tobacco

Anti-Cigarette League N-12

cross pollination, picture P-245d

curing T-104, pictures T-103, 104, K-12

Egyptian cigarettes E-199, T-103

flavoring T-104; licorice L-123

government regulation T-104

mosaic disease P-245d-d, I-90

nicotine in T-104

producing and manufacturing regions T-102-4

Cuba T-103, picture C-411

France F-174

Philippines P-169

Puerto Rico P-307, 308, picture P-309

United States T-102-3: Connecticut C-336, pictures C-337, T-104; Georgia G-56; Kentucky K-11, picture K-12; Louisiana L-208; North Carolina N-157; Virginia V-304, T-103, R-107, picture V-305

raising under cheesecloth T-103, pictures T-102, P-309

Raleigh popularizes T-102, R-49

southern colonies; money substitute M-220; shipping, picture A-157; slave labor A-157, C-249

varieties T-103-4

Tobacco, Indian. See in *Index* Lobelia

Tobacco bud-worm. See in *Index* Corn earworm

Tobacco worm (*Protoparce sexta*), the larva of a species of sphinx moth; color usually green; horn-like processes at hind end of body; feeds chiefly on leaves of tomato, tobacco, and potato plants.

Tobago, island n. e. of Trinidad; 116 sq. mi.; pop. 28,000; exports sugar, coffee, rubber, tobacco, cacao: T-142, map S-208b

"To be or not to be" H-208

To'bit, apocryphal book of Old Testament B-104

Tobog'ganing W-118, picture W-117

Tobolsk (*tō-bōl'sk'*), U.S.S.R., former province and its capital in w. Siberia, where most of Russian political exiles were sent; town of Tobolsk (pop. 25,000) about 820 mi. n.e. of Sverdlovsk; map A-332b

Tobrukh (*tō-bruk'*), also **Tobruk**, port in n.e. Libya on n. coast of Africa; pop. about 1500; deep and well protected harbor and only safe port for large vessels between Sfax in Tunisia and Alexandria in Egypt; naval base; scene of severe fighting by British and Axis in 2d World War: L-121b, map A-42a

Toby, Uncle (Captain Tobias Shandy), in Sterne's 'Tristram Shandy', a retired military officer, a simple, kind, and gallant man.

Toby Beich, Sir, in Shakespeare's 'Twelfth Night', Countess Olivia's roistering, disreputable uncle.

Tocantins (*tō-kān-tēns'*), large river in central Brazil, flowing n. 1700 mi. through undeveloped country to Atlantic Ocean; map B-226

Tocmeto'ne, Indian princess N-80

Tocqueville (*tôk-vêl'*), Alexis, Comte de (1805-59), French statesman and political philosopher; wrote 'Democracy in America', the first systematic analysis of democratic institutions in U. S.; regarded as a classic.

Tod, John (1791-1882), Canadian fur trader, born Scotland; joined Hudson's Bay Company and for some time had charge of Thompson River district in British Columbia; member of first council of Vancouver Island.

Toda (*tô'dâ*), a small tribe inhabiting the Nilgiri Hills in s. India.

Toe P-146
use in walking T-148

Toe hold, in wrestling W-183, *picture* W-182

To'ga, Roman garment D-106, *picture* D-107

Toggenburg goat, an important milk-giving breed, named for Toggenburg, district in n.e. Switzerland; color, brown with light stripe on each side of face; long-haired and short-haired types; first imported into U.S. in 1893.

Toggle-joint action, lever principle applied to jointed arms with power at knuckle to spread arms, *picture* T-109

Togo (*tô'gô*), Helmholtz, Marquis (1847-1934), Japanese admiral; commander of navy in Russo-Japanese War: R-198

Togoland, or Togo, territory in w. Africa, on Gulf of Guinea; became German colony 1884; divided as mandate to France and Great Britain after 1st World War; area of British Togoland 18,041 sq. mi., pop. about 285,000; area of French Togoland 21,815 sq. mi., pop. about 740,000: *map* A-42a

Toile de Jouy (*tuil dâ zhô-jô'*), printed cotton cloth that originated in France in 18th century T-68, *picture* T-68

'Tollers of the Sea', a novel by Hugo laid in the Channel Islands and the surrounding seas; important feature is fight with giant octopus.

Tollet soap S-177

Tojo (*tô'gô*), Hideki (born 1884), Japanese statesman and general, of Samurai class; made premier Oct. 1941; other offices include minister of war and of education: W-178v

Tokaj, Hungary, also Tokay (*tôk'oi*), town 130 mi. n.e. of Budapest; pop. 6000: *maps* B-18, A-381

Tokay (*tôk-â'*) grape, sweet, rich wine grape originally raised near Tokay, Hungary. Flame Tokay, raised on Pacific coast; ships and keeps well.

Tokelau (*tô'kâ-lou*), or Union, Islands, group in Pacific n. of Samoa; about 4 sq. mi.; pop. 1000; since 1926 a dependency of New Zealand: P-5, *map* P-10c

Tokugawa (*tô-kô'gô-wâ*), Prince Yoshinobu (1857-1918), Japanese statesman, last of the shoguns; after holding shogunate for a year he resigned (1867), opening the way for friendly relations between Japan and European powers.

Tokugawa, family name of the Japanese shoguns or "mayors of the palace," 1600-1868; made Tokyo capital of Japan.

Tokyo (*tôk'yô*), Japan, capital and largest city of the Japanese Empire; pop. 6,780,000: T-104-5, *maps* J-186, A-332a, b, *pictures* J-188c, 191a

earthquake (1923). E-137, T-104

Tokyo Imperial University, Tokyo, Japan; founded 1877; colleges of law, economics, literature, engineering, science, medicine.

Tola, an evergreen shrub (*Lepidophyllum quadrangulare*) native to the highland regions of w. South America S-208.

Toledo, Ohio, important Great Lakes port, near mouth of Maumee River at w. end of Lake Erie; pop. 282,849: T-105-6, *map* O-210

Museum of Art, *table* M-392

Toledo (*tô-lô'dô*, Spanish *tô-lô'dô*), Spain, former capital of kingdom, on Tagus River 45 mi. s.w. of Madrid; pop. 28,000; medieval Gothic art and architecture: S-226, *maps* S-226, E-326d, *picture* S-231d

Toledo, University of the City of, municipal institution at Toledo, Ohio; founded 1872; arts and sciences, engineering, pharmacy, education, law, business administration, and home economics.

Toledo War, Ohio-Michigan boundary dispute O-214

Tolerance Act, England P-369

Tolla (*tôl'fâ*), town in s. Italy; pop. 4500.

Tollma (*tô-lô'mâ*), Mount, Colombia, inactive volcanic mountain 100 mi. w. of Bogotá (18,400 ft.): *map* C-305

Toll, tax or fee imposed for a privilege granted; common tolls during 19th century in America were on turnpikes where gates barred passage. Tolls are still collected on certain bridges owned by private corporations and municipalities.

Toller (*tôl'êr*), Ernst (1893-1939), German poet and dramatist; took leading part in theater movement, his plays and technique having much influence on Russian theater; in U. S. after 1929 ('Man and the Masses'; 'The Machine Wreckers'; 'Pastor Hall').

Toll road, or turnpike T-124, R-112, 116

Tolosa (*tô-lô'sû*), battle of (1212) M-255, S-230

Tolstoy (*tôl-stô'*), Alexei Konstantinovich, Count (1817-75), Russian author, distant relative of Count Leo Tolstoy; wrote satirical and humorous verse, lyric poetry, a historical romance ('Prince Serebrany'), and a historical dramatic trilogy.

Tolstoy, Alexei Nikolaevich, Count (born 1882), Russian novelist, distant relative of Count Leo ('The Road to Calvary'; 'Bread'; 'Peter the Great'; 'Flames of Paris').

Tolstoy, Leo, Count (1828-1910), Russian writer and social reformer T-106, *picture* T-106, bust of, *picture* S-62

philosophical anarchist C-325

place in Russian literature R-197, N-183

Toltec, or Tolteca, cultured Indians inhabiting the central plateau of Mexico before coming of Aztecs; history bound up with legend and myth but they are generally believed to have reached height of development about 10th century, declining after that with invasions of barbarous tribes: M-142b

aid Mayas T-211

antiquities A-147, *pictures* M-142c

architecture, *picture* A-275

civilization A-149

use of metals A-147-8

Told (*tô-lô'*), Colombia, small seaport town 65 mi. s. of Cartagena; district supplies balsam.

Toluol, or toluene (methylbenzene), a colorless, liquid constituent of coal tar oils: C-288-9

explosive manufacture E-348

solvent for lacquer L-52

Tom, Mt., hill in w. Massachusetts, near Northampton, 1214 ft., *map* M-82

Tomahawk, a war implement of North American Indians; originally a club with head of bone, flint, or hard stone; later manufactured by white traders using European hatchet form with metal head; in Colonial times a symbol of war, giving rise to phrase "bury the hatchet" for ending quarrels.

Toman (*tô-mân'*), or ashrafi (*ûsh-rû-fê*), a gold Persian coin worth nominally about \$2.92.

Toma'to T-108-7

outworm, protection from C-418

dehydration D-38

grown without soil P-245i

mosaic disease, spread by insects I-90

origin of name M-139

when and how to plant G-7, 13

Tomato fruit-worm. *See in Index*

Corn ear-worm

Tombig'bee River, in Alabama; 450 mi. to junction with Alabama River: A-98c-d, *map* A-98

Tomb of the Unknown Soldier

England, *picture* W-73

France, *picture* W-71

United States, *picture* U-225

Tombouctou, French West Africa. *See in Index* Timbuktu

'Tom Brown's School Days', story of English public-school life, by Thomas Hughes (1857); a children's classic

courage of Tom Brown C-383

Tombs

Grant, New York City G-133

Lee, Lexington, Va. L-92

Lenin M-264, *pictures* M-263, R-191

Lincoln, Springfield, Ill. S-263

Sun Yat-sen, Nanking N-3

Taj Mahal T-4, 6, *picture* T-5

Tombs of the Kings, Cairo C-17-18, A-249

Tutenkhamon A-249-50: contents, *pictures* E-199, 200

Unknown Soldier: England, *picture* W-73; France, *picture* P-71; United States, *picture* U-225

Washington tomb, Mount Vernon W-20

Tombstone, Ariz., famous town 21 mi. n.w. of Bisbee, formerly important silver-mining center; discovered and named, 1878, by Ed Schieffelin, a dauntless pioneer prospector who had been warned that he would "find his tombstone"; health resort; silver and copper mining; pop. 822.

Tomcod, a dwarf codfish; valued as a food fish although the flesh is soft and without much flavor; also called frostfish from habit of appearing near the shore in the fall when the cold weather starts.

Tom Gate and Tower, Oxford, *picture* O-259

'Tom Jones', a novel by Fielding; hero is a free-living, exuberant young man, supposedly typical of 18th-century England.

Tomlinson, Henry M. (major) (born 1873), English traveler, essayist and novelist; began as shipping clerk in London; wrote for newspapers; voyaged to South America;

Key—câpe, ât, fâr, fâst, what, fâll; mē, yēt, fērn, thēre, fce, bî; rôw, vôn, fôr, nôt, dō; câre, bût, ryde, fûll, bûrn;

served as war correspondent in Belgium and France; literary editor *Nation and Athenaeum*; his sea tales frequently compared to Conrad's though his style is distinctly individual ('Old Junk'; 'London River'; 'Tide marks'; 'Gallions Reach'; 'All Our Yesterdays').

"Tommy," slang term for a British soldier. See Atkins, Tommy

Tomochichi (1665?-1739), Creek Indian chief; made alliance between Lower Creek nation and colony of Georgia 1733 and in many ways aided colonists; with several members of his family accompanied Oglethorpe to England (1734).

Tompkins, Daniel (1774-1825), American statesman, born Fox Meadows, N. Y.; governor of New York 1807-17

vice-president of U. S. M-240, *table* V-392

"Tom Sawyer" novel of boy life on Mississippi, by Mark Twain T-169

Tomsk (tóm'sk), U.S.S.R., Siberian city on Tom River about 120 mi. n.e. of Novosibirsk; pop. 140,000; match and leather factories; university, important library, museum; *map* A-332b

Tomte, or Tomtar, Scandinavian gnomes C-229a

Tom Thumb, General, stage name of Charles Sherwood Stratton (1838-83), American dwarf; two feet high when first exhibited by Barnum; later grew to 40 inches; name Tom Thumb originally that of miniature fairytale hero.

"Tom Thumb," Peter Cooper's locomotive, *picture* L-178

Tom-tit, a tufted titmouse T-100

Ton, unit of weight W-07, *table* T-68

metrio M-130

Tonawanda, N. Y., lumber market on Niagara River and Erie Canal 10 mi. n. of Buffalo; pop. 13,008; steel products, lumber and lumber products.

Tondi, circular plaques by Andrea della Robbia P-331

Tone S-195

music S-197

voice V-331

Tone, or value, in color C-308d, *color chart* C-308o

Tonga (tóng'gá) Islands, also Friendly Islands, chain of islands in S. Pacific e. of Fiji Islands; under British protection after 1900; about 250 sq. mi.; pop. 32,000; capital Nukualofa on principal island Tongatabu; copra and bananas P-5, *map* P-10c

natives, *picture* P-6

Tongs, a tool T-110

Tongue T-107

animals, curious forms T-107

chameleon C-137b, *pictures* C-138

fly, *picture* F-128

moth, *picture* B-285

physiology of P-208

snail, *picture* S-168

snake S-170

spider, *picture* S-255

taste, sense of T-16, 107

toad T-107, *picture* T-101

woodpecker W-134, *picture* W-135

Tongue-tied T-107

Tonic, in music, the first tone in any scale; the keynote: M-319

Tonka bean, or cumara nut V-273, N-188

Tonkawa (tóng'ká-wá), a nomadic Indian tribe formerly of Texas, removed to Indian territory (Oklahoma) in 1884.

Tonkin (tón'kin'), or Tongking, protectorate in n. French Indo-China,

about 45,000 sq. mi.; pop. 8,700,000; cap. Hanoi: I-73a-d, *map* I-73b

Tonnage, of ships S-130

Detroit River and Sault Sainte Marie canal G-146b

dues, basis of S-130

largest vessels S-128

river that carries most D-57

U. S. Merchant Marine S-129, *picture* S-128a

world merchant marine S-129, *picture* S-128a

Tonopah (tón'pá), Nev., mining town in s.e.; had great boom in early 20th century: N-78, *map* N-77

"Tonquin", an ill-fated fur-trading ship F-226

Tonsils, two small masses of lymphoid tissue in the back of the mouth; inflammation called tonsillitis.

Ton'sure C-232

Tonto National Monument, Ariz. N-22d

Tonty, or Tonti (tón'tí), Henri de (1650?-1704?), French explorer, born Italy, LaSalle's companion on explorations down Mississippi River L-66-7

Arkansas land grant A-299

Tony Lumpkin, character in Goldsmith's comedy 'She Stoops to Conquer', a coarse ignorant country youth fond of practical joking.

Tools T-108-12. See also in *Index*

Machinery

accident prevention S-2g

agricultural A-47-8, 49, 51

camp equipment C-45-6

civilization, importance in, *picture* C-244

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Egyptian A-257

evolution of, *photograph* T-110a

handles, best wood for A-323

high-speed cutting alloys A-131: tungsten T-150

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iron and steel I-133

machine tools T-111-12

measuring devices T-112: micrometer M-155

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primitive, *picture* T-108

Roman, ancient, *pictures* R-133

Stone Age S-292-3, M-46, 47, 48, A-253-4, 148; obsidian for cutting edges M-184-5

Toombs (tóm's), Robert (1810-85), American statesman and Confederate general, born Washington, Ga.; for short time Confederate secretary of state; refused to take oath of allegiance to U. S. government after Civil War and never restored to full rights of citizenship

Compromise of 1850 C-327

Toothache, caused by decay T-28

how treated in India, *picture* I-36

Tooth-ache tree. See in *Index*

Prickly ash

Toothed whales W-78, 80

Tooth shell S-108

Toothwort, a genus (*Dentaria*) of perennial plants of the mustard family found in northern hemisphere; low growing, with clusters of tiny white, rose, or purple flowers; includes pepper-root (*D. diphylla*), with scaly roots that taste like watercress.

Toothwort, a genus (*Lathraea*) of leafless plants parasitic upon roots of beech, willow, poplar, or hazel, *picture* P-68

Top, gyroscopic G-191

Topaz, a semiprecious stone found in Brazil and the Ural Mountains; most so-called topazes are really "citrines," a Brazilian yellow quartz, produced also by heating

smoky quartz: G-29

chemical composition M-184

medicinal use G-26

November birthstone G-25

relative hardness M-181

Tope (tóp), primitive circular structure containing relics of Buddha; sometimes elaborately carved

Sanohi Tope gate, *picture* I-39

Topeka, Kan., state capital, 57 mi. w. of Kansas City on Kansas River; pop. 67,833; printing and packing plant, iron works; headquarters of Santa Fe Railroad; Washburn Municipal University of Topeka; one of "Free Towns" settled 1854 by eastern anti-slavery men: *map* K-4

capitol, *picture* K-5

industries K-5

Toplady, Augustus Montague (1740-78), English clergyman, author of hymn 'Rock of Ages'.

Top minnow, or Gambusia, small swamp-fish (*Gambusia affinis*) of the minnow family

enemy of the mosquito M-270

Topographic surveying S-332

Topsoil S-190-1, 191b

drought affects D-113c

erosion C-342

Topsy, in Mrs. Stowe's 'Uncle Tom's Cabin', mischievous, ignorant little imp of a slave girl; asked if she knows who made her, replies "Nobody. I 'spects I just growed."

Toquilla (tò-ké'yá), small palm (*Cardinalia palmata*) of cyclanthus family, native to n. South America. Grows 6 ft. to 10 ft.; stemless; leaves dark green, flat, with drooping finger-like segments, have long, stiff, erect petioles (stems). Fiber obtained from leaves used to make Panama hats. Plants also used as ornamental potted palms in U. S. Sometimes called jiplapa (from town in Ecuador where some hats are made): H-235, S-208j

Torah (tò'rá) (Hebrew "law"), first five books of Bible M-285

Toral y Velazquez, José (1832-1904), Spanish general in Spanish-American War; defended Santiago de Cuba; surrendered Spanish forces in eastern Cuba.

Torch Bearer, in Camp Fire Girls C-41

Torch-lily. See in *Index*

Kniphofia

Tordesillas (tór-dá-sél'yás), Treaty of, between Spain and Portugal, regulating their rights of discovery and conquest; signed June 7, 1494 at Tordesillas, Spain, because of dissatisfaction of Portugal with "Line of Demarcation"; under the terms of the treaty Brazil, then undiscovered, later fell to Portugal: S-208f

Torenia (tò-ré'ní-á), a genus of low-growing annual and perennial plants of the figwort family, native to tropical Asia and Africa. Slightly hairy and branching with small terminal clusters of snapdragon-like flowers, yellow, blue, purple, or white with contrasting color in throat.

Torgau (tór'gou), Germany, historic town on Elbe, 30 mi. n.e. of Leipzig; prominent in Reformation; victory of Frederick the Great over Austrians 1760 (Seven Years' War); in 1814 taken by Germans after siege of 8 months.

Toric lens S-240

Torii (tò'ri-é), Japanese sacred gateway J-196, *picture* J-190

Torino (tò-ré'nó), Italy. See in *Index*

Turin

Tormes (tór'más) River, rises in mountains of cent. Spain, flows n.w. 150 mi. to Douro River.

Torna'do S-298, picture S-299 causes waterspouts at sea W-53

Tornio (*tôr-nô-ô*) River, also Tornea, and Torne, rises in Swedish Lapland and flows s.e. 250 mi. to Gulf of Bothnia, lower course separates Sweden and Finland: map N-173

Toron'to, Ontario, cap. and chief city; pop. 631,207; T-112-13, map C-500 Great National exposition F-5 Mackenzie, reformer M-12 museum, table M-393

Toronto, University of, at Toronto, Ontario, Canada; non-sectarian; founded 1827 (present name 1849); arts (including pure science and commerce), medicine, applied science, and engineering, household science, education, forestry, music, dentistry, law, pharmacy, agriculture, veterinary science. *Federated institutions*: Victoria University, Methodist in origin, now United Church, but non-sectarian, established and opened 1841; Trinity College, Church of England, chartered 1852, theology; St. Michael's College, Catholic, founded 1851; Knox College, Presbyterian, opened 1844, theology; Wycliffe College, Anglican, founded 1879, theology; T-113

Torpe'do, self-propelled naval explosive device T-113-16 American type T-114, N-56 Bliss-Leavitt T-114 gyroscopes control direction G-192 submarine S-311, 312, 314, T-113-14 Whitehead T-114

Torpe'do boat, small boat designed for torpedo attacks N-55, 56 "mosquito fleets" M-291

Torpedo boat destroyer N-55-6, S-312, 314, pictures N-56, W-161

Torpedo-boat, or electric ray T-113

Torpedo plane, picture A-74a

Torquay (*tôr-kê*'), England, seaport and watering place on coast of Devonshire; pop. 46,000; ruins of medieval buildings; landing place of William of Orange 1688.

Torque (*tôr-k*'), rotational force in physics P-192

Torquemada (*tôr-kâ-mû'dâ*), Tomás de (1420-98), Spanish Dominican friar, fanatic organizer of Spanish Inquisition; burnt at least 2000 persons; incited expulsion of Jews from Spain; I-80

Torrens system, system for transfer of real estate by registration in place of cumbersome method of deeds; titles to all property accepted for registration guaranteed by state and transfer effected by simple registration of fact with proper official; first used in Australia 1857; adopted in many parts of British Empire and U. S.

Torreón, Mexico, state of Coahuila; manufacturing center and r.r. junction; cotton, flour mills, smelters; pop. 66,000; M-133, 139, 140

Torres Strait, between Cape York Peninsula, Australia, and island of New Guinea: N-85, A-372, map A-372a

Torres Vedras (*tôr-rêsh vâ'thrâsh*), town in Portugal, 43 mi. n.w. of Lisbon; pop. 5000; site of fortification lines with which Wellington held off advance of French under Masséna from September 1810 to March 1811 and arrested Napoleon's Peninsular Campaign.

Torres Villarroel, Diego de (*tôr-râs vâ-yâ-rê-êl'*) (1694-1770?), Spanish autobiographer and charlatan; his 'Vida' told of his adventurous life and attacked current evils.

Torrey, John (1796-1878), American botanist, born New York; made his

living as a chemist; introduced new classifications in his systematic study of American plant forms.

Torrey pine, a rare evergreen tree (*Pinus torreyana*) of pine family, native to San Diego County and Santa Rosa Island, Calif. Trunk twisted, but sometimes grows to 60 ft.; crown flat. Leaves in fives, to 13 in. long; cones broad, oval, chocolate brown, to 6 in. long, contain edible seeds that are gathered and used as nuts. Wood sometimes used as fuel.

Torricelli (*tôr-rê-chêl'êl*'), Evangelista (1608-47), Italian physicist; among first to establish properties of atmosphere and gases invents mercury barometer B-50

Torrid zone. See in Index Tropics

Torrington, Conn., manufacturing borough 23 mi. w. of Hartford on Naugatuck River; pop. 26,988; machinery, brass products, woolen goods; birthplace of John Brown: map C-338

Torsion balance, or pendulum, a form of balance in which the horizontal rod is suspended by fine fibres, usually of quartz, instead of being supported on knife edges; used by Cavendish in determining the mass of the earth; invented by Rev. John Mitchell (18th century); P-109 weighs earth B-132

Tort, in law, a civil or private wrong for which one is entitled to sue for damages (fraud, slander, libel, alienation of affection, assault); a breach of contract is not a tort.

Tortilla (*tôr-tê-yâ*'), Spanish-American corn cake C-133a grinding corn for, picture M-136

Tortoise (*tôr-tis*'), name commonly used for land-dwelling types of turtle T-116. See also in Index Turtle

Tortoise beetle, small beetles so named on account of their form; most are beautifully colored, often a golden hue; some feed on sweet potatoes and similar plants.

Tortolosa Islands. See in Index Galápagos

Tortoise shell T-116, 167

Tortoise-shell butterfly, a medium-sized butterfly of the genus *Vanessa*, related to the Mourning-cloak eggs, picture B-193

Tortoise-shell cat C-96

Tortricidae (*tôr-trîs'î-dê*'), a family of small moths, many of whose larvae roll leaves to form a shelter in which to feed; popular name leaf rollers.

Tortugas. See in Index Dry Tortugas

Torture, as punishment P-348-9 iron virgin, Nuremberg N-186 Star Chamber uses S-276

Torun (*tôr-qn*'), Poland, also Thorn, fortified town on Vistula River, n.w. of Warsaw; pop. 54,000; birthplace of Copernicus.

Tory, or Loyalist, in American colonies R-86, picture R-85. See also in Index United Empire Loyalist settle in Canada after Revolution R-92, C-59

Tory party (England) P-291. For later history see in Index Conservative party (Great Britain)

Catholic Emancipation Bill O-201, P-100

Swift and S-343

Tosea, La' (*lâ tôs'hâ*'), opera by Puccini, story O-234, picture O-230

Toscana. See in Index Tuscany

Toscaneli dal Pozzo (*tôs-kâ-nêl'êl dâi pô'tsô*'), Paolo (1597-1482), Italian astronomer; believed western route to the Indies possible, and imparted views to Columbus.

Toscanini (*tôs-kâ-nê'nê*'), Arturo (born 1867), Italian operatic conductor of international fame, born Parma, Italy; conductor at La Scala Opera House, Milan, 1898-1908 and 1920-29; conductor 1908-15 Metropolitan Opera House, New York City; conductor New York Philharmonic Symphony Orchestra 1926-36; conductor Bayreuth and Salzburg festivals; organized and conducted National Broadcasting Co. symphony orchestra after 1937.

Tosti (*tôs'tê*'), Sir Francesco Paolo (1846-1916), Italian-English composer, born Ortona, Abruzzi; taught in Naples and Rome, and was singing teacher to royal family in London, where he was knighted; composed many popular songs in Italian and English ('Good-bye').

Totalitarian state G-126, W-178b communication control C-324b emigration policy I-24 foreign trade, methods I-111-12 principles (fascism) F-18 rise of D-47-8

Total war W-178d

Totemism, system in which members of a clan are linked through association with a mythical animal F-11

Totem pole F-83, I-56, picture F-9 forerunner, picture I-63

Totora (*tô-tô-râ*'), a reed (*Scirpus ripartus*) of the sedge family, native to South America S-2081 boat made of, picture B-168

Toucan (*tû-kân'*'), a bird T-116, pictures T-116, S-2081 foot, picture B-129 head, color plate B-130

Touch, sense of T-116-17, S-76 cells responsible for B-220, S-157 education of blind, use in B-156-7 illusions I-20 nerve endings S-157, T-116 plants sensitive to P-242-3 skin mechanism S-157 testing sensitiveness T-117

Touchdown, in football F-150

Touch football F-152

Touchstone, clown in 'As You Like It' A-323

Touchstone, bas'altic, or Lydian stone, a black quartz formerly used in testing gold proportion of alloys; process started with Lydians around 500 B.C.

Toul (*tgl*'), France, strongly fortified town, 15 mi. w. of Nancy; pop. 13,000; important in Middle Ages; taken by Germans 1870, threatened by them 1914, and taken again 1940.

Toulon (*tq-lôn'*'), France, important seaport and naval station on Mediterranean; pop. 160,000; 1707, unsuccessfully besieged by Allies under Prince Eugene; 1744, British fleet defeated by French and Spanish; 1793, Napoleon defeated England and Spain, his first memorable victory; map E-326d naval station F-172

Toulouse (*tq-lqz'*'), France (ancient Tolosa), cathedral city, commercial and manufacturing center in s.w. on Garonne River; pop. 215,000; university; map E-326d

Toulouse-Lautrec (*tq-lqz' lô-trêk'*'), Henri de (1864-1901), French painter and lithographer; known for caricatures and posters; dealt with ballet and circus life and the night life of Paris.

Touraine (*tq-rên'*'), former province of w. cent. France, now department of Indre et Loire; cap. Tours; L-181, map F-179 united with English crown under Henry II H-275

Tourecoing (*tq-koân'*'), France, manufacturing town 8 mi. n.e. of Lille;

Key—côpe, ôt, fât, fâst, whet, fâll; mô, yât, fêrn, thêre; fœ, bit; rôw, wôn, tôr, nôt, dq; câre, bût, ryde, fûll, bûrn;

pop. 78,000; woollens, carpets, upholstering materials; captured by Germans 1914 and 1940.

Tourgée (*tgr-zhā'*), Albion Winegar (1838-1905), novelist, Civil War soldier, born Williamsfield, Ohio; in South during Reconstruction; novels about it ('A Fool's Errand'; 'Bricks without Straw').

Tourmaline, a semiprecious stone G-29

chemical composition M-184

polarization of light L-130

Tournai (*tgr-né'*) Belgium, also Doornyk, city on Scheldt River near French border; pop. 36,000; Brussels carpets, textiles, porcelain; devastated by German invasion 1914; map B-87

Brussels carpets B-88

Tournament, sport of Middle Ages in which knights fought in pairs or groups K-30-1, picture K-29

Tourniquet (*tgr-ni-két*), bandage F-63

Tours (*tgr*), France, city on Loire River; pop. 84,000; makes silk stuffs, chemicals, iron and steel; occupied by Germans 1871; temporary capital of France June 1940: L-181, map F-179

Tours, battle of (732) C-153

Toussaint L'Ouverture (*tgr-sān' lq-vér-tür*), Pierre Dominique (1746?-1803), Haitian Negro rebel and liberator; threw off French rule and declared himself governor general of Haiti in 1801; captured by treachery; died in French prison: H-198

Tow (*tō*), short and broken fibers of hemp or flax; the long fibers of flax, hemp, and jute when ready for spinning are also called tow.

Tower, in architecture A-269. *See also in Index* Bell-tower

Amsterdam, Mint, picture A-189

Eiffel, Paris, picture F-173

Kutb Minar at Delhi, picture D-42

leaning tower of Pisa P-222, picture P-223

minaret, picture M-214

pagoda or tower temple; Burma B-278, picture B-278a; China, picture A-275

skyscraper tower, picture N-125

steepie, origin of A-269

Tower Bridge, London L-183, B-240, picture B-241

Tower of London L-182-5, picture L-190

Henry VI murdered H-277

Raleigh in R-50

Tower of the Winds, public clock in Athens, picture A-354

Towers, John H. (born 1885), naval officer, born Rome, Ga.; noted aviator, made head of U. S. Bureau of Aeronautics 1939 and commander of U. S. Navy air forces in Pacific Sept. 1942.

Towers of Silence, Bombay B-171

Towhee, or Chewink, a finch P-35

Town, in United States, a political division of a state; in New England the unit of representation; in western states subdivisions of the county generally called townships. *See in Index* City

"Town and gown" fights E-172

Town ball, forerunner of, and somewhat similar to, baseball.

Town crier, a town official who makes proclamations and announces news, pictures C-324a, T-75

Towns, Charles Hanson (born 1877), American poet and editor, born Louisville, Ky.; editor *The Designer*, *Smart Set*, *McClure's Magazine*, *Harper's Bazaar*; wrote novels, but best known for poems

('The Quiet Singer'; 'Manhattan, a Poem'; 'Beyond the Stars').

Town government T-117, A-154

Connecticut C-340

London D-46

meeting, picture U-234

retained in Vermont V-288

Rhode Island R-96-7

Town meeting T-117, picture U-234

Rhode Island 98-7

Vermont V-288

'Town Meeting of the Air, America's', educational radio program, founded New York City in 1935 by George Vernon Denny, Jr., to broadcast discussions of current questions; address Town Hall, 123 West 43d St., New York City

broadcast, picture R-28b

Townsend, Francis Everett (born 1867), American physician, born Fairbury, Ill.; author of *Townsend Plan*: S-179

Townshend (*toun'sēnd*), Charles (1725-67), English politician; chancellor of the exchequer under Pitt; author of *Townshend duties*.

Townshend, Charles Townshend, 2d Viscount (1674-1738), English statesman; ambassador at Hague 1709-11; secretary of state 1714-16, again 1721; devoted later life to agriculture; four-crop rotation plan credited to him: R-83

Townshend, Sir Charles Vere Ferrers (1861-1924), British general; captured in 1st World War: W-157

Townshend duties, taxes levied on American colonies R-83

Township

government, U. S. T-117

land survey, U. S. L-60

Towton, England, village in Yorkshire, 11 mi. s.w. of York; decisive victory of Yorkists under Edward IV and over Lancastrians 1461 ('Wars of the Roses').

Toxieden'drol, poison of poison ivy P-272

Toxin (from Greek word meaning poison), poison produced in the body by action of bacteria or other biological agency: G-78

affected by emotion E-262

antitoxins A-223

Toyn'bee, Arnold (1852-83), English pioneer in settlement work S-181

Toynbee Hall, first social settlement, London S-181

inspiration for Hull House A-17

Toyokuni (*tō-yō'kq-nō*) (1768-1825), Japanese artist J-202

Toyon. *See in Index* Christmas-berry

Toys T-117-19

boat of Dutch boy, picture N-71

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Greek and Roman D-86, T-119

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"roly-poly" explained, picture P-192

United States production T-118

Trabzon (*trāb-zōn'*), Turkey. *See in Index* Trebizond

Trachea (*trā'kē-ā*), air passage or windpipe of an animal

cranes C-391

insects I-87, photograph H-258a

man, picture L-219

whale W-77

Trachite, an igneous rock M-184

Trachodon (*trā'kō-dōn*), a giant prehistoric reptile A-206

Trachoma (*trā'kō-mā*), or granular conjunctivitis, contagious affection of eyeball covering, eyelid lining;

called "granular lids"; associated with unsanitary conditions; may cause blindness.

Trachymene (*trā-kim'ē-nē*), a widely used annual plant of the parsley family. Leaves hairy, divided; globular flower heads of soft blue or white; also called didiscus, blue lace flower, or lavender lace flower; native to Australia.

Track and field sports A-356

bibliography H-313d

Trackless trolley, street car S-308, picture T-125

Tractor

farm, pictures A-51, 53, 55, P-259, R-191, W-31

Tracy, Alexandre de Prouville, Sieur de (1603-70), lieutenant general of French territories in America 1663-67; 1666 made successful campaign against the Iroquois.

Tracy, Spencer (born 1900), actor, born Milwaukee, Wis.; first stage appearance 1922; in motion pictures after 1930; won annual award of Motion Picture Academy of Arts and Sciences 1937 for rôle in 'Captains Courageous' and 1938 for 'Boys' Town'.

Trade C-321-3, I-110-12. *See also in Index* Commerce

Trade, Acts of, British R-85, A-159-60

Trade, Boards of B-160-1

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Trade Commission, Federal F-22, U-231

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Trade rat, pack rat, or wood rat R-51

Trade routes C-323. *See also in Index* Air lines and airways; Inland waterways

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Trade schools, in U. S. V-315

Trade treaties, commercial C-323

Trade unions L-44-5. *See also in Index* Labor movement

Trade winds W-112, picture W-113

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Trafalgar (*trā-fāl-gār'*), cape of s. Spain at n.w. entrance to Strait of Gibraltar

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Trafalgar (*trá-fál'gár*) Square, London L-189, *picture* L-186
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Tragedy (*trág'è-dì*)
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Trag'opan, or horned pheasant, a brilliant bird of the Himalayas; has hornlike projection behind each eye; nests in trees.
Trailer, automobile A-387
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Trailing arbutus, or ground laurel A-248
Trailing myrtle, common name for periwinkle, genus of plants of dogbane family with opposed evergreen leaves M-326
Trails, Catherine P. S. (1802-1899), Canadian author and naturalist, born London, England; sister of writers Agnes and Elizabeth Strickland and Susanna Moodie ('Backwoods of Canada'; 'Rambles in the Canadian Forest').
Trail Riders of the Wilderness N-22f
Trails, United States
 colonial T-124, R-112
 western F-15-17, T-126, map U-242
Trail Seeker, of Campfire Girls C-41
Train, Arthur (born 1875), American lawyer and author, born Boston, Mass.; sprightly stories of legal profession ('Tutt and Mr. Tutt', 'His Children's Children', 'High Winds', 'Ambition', 'Illusion', 'My Day in Court', autobiography).
Train, George Francis (1829-1904), American author and financier, noted for eccentricities, born Boston, Mass.; successful merchant in Boston and Australia, attempted to form street railway companies in England but failed ('Young America Abroad').
Trainbands, groups of men trained for local military service in England, 16th, 17th, and 18th centuries.
Train dispatcher R-43-4, *picture* R-42
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Trajan (*trá'ján*) (Marcus Ulpius Trajanus) (53?-117 A.D.), Roman emperor 98-117; born in Spain; adopted by Nerva; able ruler, great builder; conquered Dacia, Armenia, and Parthia
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 founded Uplian Library L-103
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Trajan, Column of E-332, *picture* G-169
Traley'ka, or Denall, native name for Mt. McKinley.
Tramp steamers C-323
Transilk, in silk weaving S-148
Trang'ka, monetary unit of Tibet, worth about six cents in United States money.
Transalpine Gaul. *See in Index* Gaul
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Transcaucasia. *See in Index* Caucasasia
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Transcendentalism, a literary and philosophical movement in New England of which Emerson was chief leader E-260, A-178. *See also in Index* Brook Farm
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Transfiguration, festival of the Christian church, August 6.
Transformer, device for changing voltage of alternating electric current T-119, E-229
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 rotary. *See in Index* Converter, rotary
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Transfusion, blood B-158, *picture* B-157b
Trans-Iranian Railway P-132
Trans'it, of Mercury and Venus, passage of either planet between the earth and the sun; seen in telescopes as passage of black dots: P-230, 231
Transit, surveying instrument S-332
Transit, a telescope mounted to rotate vertically O-193, *picture* T-94
Transitivo verb V-281, S-78
Trans-Jordan, British mandated territory in Asia Minor, e. of Palestine; about same territory as old Seljuk kingdom of Kerak; estimated area 34,740 sq. mi.; pop. 260,000; cap. A m m a n (Philadelphia): P-36-7, A-240, map A-242
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 telegraph T-32, 34, *pictures* T-33
 telephone T-34, *picture* T-35
 television T-41-2
Transmutation of elements, change of chemical elements into others; achieved on small scale by modern chemists; occurs spontaneously in radium and other radioactive elements: A-362, R-32, 33-4
 alchemists attempted C-178
Transom, in building, the horizontal crossbar of a window as distinguished from a perpendicular bar or mullion; also crosspiece separating a door from a ventilating window above it; this window is also popularly called a transom.
Transom, nautical term; board forming stern of small boat; also a seat in cabin with lockers beneath.
Transpacific aviation A-90, *pictures* A-73, table A-74
Transpiration, a process in plants whereby the water absorbed by

the roots is given off mainly through the stomata, or "breathing pores," in the leaves: L-88, P-240, W-42b
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Transplanting, in agriculture and gardening
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Trans-Siberian Railway, railway between Chelyabinsk and Vladivostok (3886 mi.) R-37, S-137
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Vladivostok terminus V-312
Transubstantiation, in Roman Catholic doctrine, the change which transforms bread and wine into the body and blood of Christ when the priest pronounces the words of consecration during mass.
Transvaal (*trāns-vā'*), province of Union of South Africa; 110,450 sq. mi.; pop. about 3,350,000 (whites, 820,000): T-126-7, S-202-3, maps S-202, A-42a
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Transvaal daisy. See Gerbera
Transver'sal, in geometry a line which crosses or cuts other lines: *diagrams* G-48, 50
Transverse arch, or mediotarsal arch, of the foot F-148
Transverse vibrations, of light, *diagram* L-130
Transylvania, region in cent. Europe; 22,312 sq. mi.; pop. 2,680,000; long a part of Hungary; transferred to Rumania 1919; n. half ceded to Hungary 1940: R-175, 176, maps B-18, A-381
Transylvania College, at Lexington, Ky.; non-sectarian; founded 1780; arts and science.
Transylvanian Alps, range of Carpathian Mountains in Rumania and Hungary R-175, maps B-18, A-381
Trap. See Traps and trapping
Trap, in plumbing F-260
Trapani (*trā'pā-nē*), seaport and industrial center on n.w. coast of Sicily; pop. about 84,000; ancient Drepanum, important Carthaginian naval station in First Punic War; Roman fleet defeated 250 B.C.; map I-156
Trapdoor spiders S-254-6, pictures S-256
Trapeze, a horizontal bar hung by ropes like a swing; used by gymnasts and acrobats
circus, picture C-237f
Trapezoid, in geometry M-115
Trapezus, Turkey. See Trebizond
Trapper's, or hunter's, fire C-47
Trappist cheese, a semi-hard cheese of rubbery texture and flavor between Cheddar and Limburger; developed by Trappist Fathers of Quebec; also called Oka; French cheese of this type known as Port du Salut.
Trappists, branch of the medieval Cistercian order of monks; founded 1664 by Armand de Rancé, abbot of La Trappe, a Cistercian abbey

in Normandy; observes strict fasting, silence, work, prayer, and isolation from the world.
"Traps," with bass drum, picture M-322
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lobster traps, picture L-176
steel spring trap T-127, picture T-128
Trasimeno (*trā-sē-mā'nō*), Lake, also Trasimene and Trasimenus, in cent. Italy, 10 mi. w. of Perugia; about 50 sq. mi.; scene of battle (217 B.C.) in which Hannibal defeated the Romans.
Travancore (*trā-vān-kōr'*), a progressive state of s. India; area 7625 sq. mi.; pop. 5,095,000; mainly agricultural; rice, coconuts; cotton cloth, mats, carved ivory and teak; cap. Trivandrum; ruling power descends through female line; women on equal footing with men; free primary education; nearly one-third pop. Christians.
Travel
etiquette E-312d-13
vacation activities V-266j-l
Travelers Aid and Transient Service, National Association for, founded 1917; developed from local Travelers Aid founded 1851 in St. Louis, Mo.; supported by voluntary contributions; purpose is to give aid to handicapped and inexperienced travelers and transients; local bureaus found in many cities in U.S.
Travelers' checks, a form of letter of credit C-394
Travelers' tree, or ravenala, a tall, fan-shaped tree of the banana family pictures P-39, M-17
Traveling libraries L-106d
"Travels with a Donkey", by R. L. Stevenson S-287
Travers, Morris W. (born 1872), English chemist, co-discoverer with Sir William Ramsay of neon, krypton, and xenon; authority on glass technology.
Travers, Pamela L. (born 1906), Irish author of children's books; "Mary Poppins" and "Mary Poppins Comes Back" are fantastic yet human fairy tales about a nursemaid.
Traverse, Lake, on boundary of South Dakota and Minnesota R-62, map S-218
Traverse City, Mich., port and resort on Grand Traverse Bay, arm of Lake Michigan 50 mi. n.e. of Manistee in fruit-growing section; pop. 14,455; map M-163
Travertine, a pure limestone rock; large deposits in Italy, where it has been used for building since Roman times; easily worked but hardens on exposure
how formed L-138
"Traviata, La" (*lā trā-vē-ā'tū*), opera by Verdi story C-234
Travis, William Barret (1809-86), Texas patriot, called "the gallant Travis"; born South Carolina; admitted to bar at 19; moved to Texas 1830 and soon became prominent member of "war party"; leader of volunteers who captured troops sent by Mexico to Anahuac fort (1835); fought at San Antonio; died hero's death in command of the Alamo: T-60
Travols (*trāv-vō'*), Indian moving van I-62, pictures I-58, T-123
Trawl, a fishing device
otter trawl F-80
trawl line F-79

- Tray agriculture, or chemical farming L-61d, P-245f-4
- Treadmill, penal machine once used in prisons. The criminal was forced to keep stepping on a series of treads, furnishing power. Treadmills operated by horses or dogs are sometimes still used.
- Treason, a crime against the state G-126, U-215
Arnold A-309-10
Brown, John B-250
Burr accused of B-280-1
punishment for F-349
- Treason Speech, of Patrick Henry H-280
- 'Treasure Island', by Robert Louis Stevenson, thrilling story of pirates and hidden treasure; the hero is Jim Hawkins and the villain is Long John Silver: S-288, K-16
- Treasurer of the United States U-223
- Treasure State, popular name for Montana.
- Treasure-trove, in law, ownerless coinage metal (gold or silver) in plate, coin, or bullion form, found hidden in the earth or concealed in a house or other private place. In England, trove belongs to the state; in the United States, in the absence of statute, it belongs to the finder.
- Treasury, Mount, in Elk range of Colorado, 13,444 ft. high.
- Treasury Department, U. S. U-222-3, chart U-229
Alaska formerly administered by A-103
building W-25
Bureau of Customs U-223, T-13
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- Treasury of Pharaoh, ruin in Petra, Arabia, picture A-325
- Treat, Robert (1622-1710), American colonial soldier and statesman, for 18 years governor of Connecticut: C-340
founds Newark N-80
- Treaties, compacts or agreements between states T-129-30. For list of famous treaties, see table on following pages. See also in Index treaties by name, as London, treaty of; Paris, treaty of
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signatures, picture W-178
State Department U-222
- Treaty Division, U. S. government U-222
- Treaty ports
China C-221j-k; Shanghai S-101
- Treb'la River (modern Trebbia), in n. Italy; rises in n. Apennines; flows n.e. for about 60 mi. and enters Po River near Piacenza; near here Hannibal defeated the Romans in 218 b.c.
- Trebizond (treb'i-zond), Turkey, also Trapezon (ancient Trapezus), seaport on Black Sea; pop. 80,000; varied manufactures; former center of transit trade between Europe and Persia; capital of empire of Trebizond 1204-1461; during World War taken by Russia 1916; recaptured by Turks in 1918: maps B-154, B-8
- Treble, in music, highest part of harmonized music, usually containing the melody part; anything written in the upper or G clef.
- Tree, Sir Herbert Beerbohm (1853-1917), English actor-manager, half-brother of Max Beerbohm; famous for elaborate revivals of Shakespeare's plays, author of 'Thoughts' and 'Afterthoughts', essays.
- Tree cabbage, also called Jersey cabbage C-1
- Tree cricket C-397
- Tree day A-247
- dates of observance, list A-444
- Tree-dwellers, people who habitually build their homes in trees
New Guinea, picture N-84
prehistoric man M-47
- Tree fern, a family (*Cyatheaceae*) of tropical tree-like ferns; grows 8 ft. to 50 ft. high: F-24
- Tree-frog (*Hyla versicolor*), or tree toad F-209, picture F-207
- Tree kangaroo K-2
- Tree-mallow. See in Index Lavatera
- Tree of heaven. See in Index Ailanthus
- Tree of Knowledge of Good and Evil, a tree in the garden of Eden, the fruit of which Adam and Eve were forbidden to eat
'Paradise Lost' M-180
'Tree of life' design T-66
- Tree Planters' State, popular name for Nebraska N-58, A-247
- Trees T-130-7, list, Outline N-40-1. See also in Index Forests and forestry; Lumber and timber; Plants; and the various trees, as Ash, Buckeye, by name
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- 'Trees', poem by Joyce Kilmer, quoted A-247
- Tree sparrow, picture S-238
- Tree surgery T-137, T-131
grafting F-211, pictures F-213
- Tree swallow S-333
- Tree-toad, or tree-frog (*Hyla versicolor*) F-209, picture F-207
- 'Tree wool,' cotton C-379
- Tree worship
Druids C-124
- Tree yucca. See in Index Joshua tree
- Trefoil ('three leaved'), a name applied to the clovers and other plants having compound leaves in three parts. In architecture, a three-leaved decoration.
- Treitschke (trish'kū), Heinrich von (1834-96), German historian; 'History of Germany in the Nineteenth Century', one of most brilliant historical works ever written; its strong nationalist and anti-English bias believed to have powerfully influenced German political thought.
- Trek, migrations of Boers in South Africa S-199, 200
- Trelawny, Edward John (1792-1831), English writer, and friend of Shelley and Byron, born London, England; served in the navy; was idol of London society; author of 'Records of Shelley, Byron, and the Author'.
- Trembles, also called milk sickness C-107
- Trembling poplar, or quaking aspen F-304, pictures P-303
- Tremont Street, Boston, origin of name B-202
- Trench, Herbert (1865-1923), British poet and dramatist ('Deirdre Wedded'; 'Apollo and the Seaman'; 'Napoleon').
- Trench, Richard Chenevix (1807-86), archbishop of Dublin, poet, and philologist ('The Study of Words'; 'English Past and Present').
- Trench fire C-47-47a
- Trench mortar, mortar used for firing heavily charged projectiles into nearby trenches by high angle of fire; especially Stokes mortar, which fires propelling charge in base of projectile when latter is dropped into the bore.
- Trench warfare
Civil War, picture C-252
first World War W-156, pictures W-163: airplane view, picture W-160; Aisne River A-95
- Trengganu (trēng'gā-nū), unfederated Malay State, under British protection since 1909; 5050 sq. mi.; pop. 195,000; chief exports, iron ore, rubber: M-43
- Trent, Italy, also Trento, city in n.e.; pop. 60,000: T-137
- Trent, a river of central England flowing s. and n.e. 170 mi. to Humber; numerous canals to midland manufacturing cities: map E-279
- Trent, Council of (1545-63) R-67, T-137, P-227
- 'Trent' Affair, in American Civil War T-138
- Trent Canal, Canada C-69, H-363, picture O-227
- Trentino (trēn-tē'nō), district in Tyrol, acquired by Italy after 1st World War T-137
- Trento, province in Italian Tyrol T-176
- Trenton, N. J., state capital and greatest pottery center of U. S., 84 mi. n.e. of Philadelphia; pop. 124,697: T-138, map N-90
archeological remains A-148
battle (1776) T-138, R-90
capitol, picture N-92

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SOME HISTORIC TREATIES AND ALLIANCES

- Adrianople (1829).** Closed Russo-Turkish War of 1828-29; recognized independence of Greece.
- Aix-la-Chapelle (1668).** Closed war between France and Spain for possession of Spanish Netherlands (War of Devolution).
- Aix-la-Chapelle (1748).** Closed war of Austrian Succession (King George's War in America); possession of Silesia and Glatz guaranteed to Prussia.
- Alaskan Boundary Arbitration (1903).** Settled the boundary between Canada and Alaska.
- Alaskan Purchase Treaty (1867).** United States purchased Alaska from Russia for \$7,200,000.
- American-Chinese Treaty (1844).** First treaty between China and the United States, concluded at Macao by Caleb Cushing; a treaty of trade and amity, granting extraterritorial rights.
- American-Japanese Treaty (1854).** See Perry's Treaty.
- Amiens (1802).** Between Great Britain and France, affording break in wars of French Revolution.
- Anglo-Japanese Alliance (1902).** Between Great Britain and Japan providing for mutual defensive aid in safeguarding British interests in China, and Japanese interests in China and Korea.
- Armed Neutrality of the North, League of (1780).** Formed by Russia, Sweden, and Denmark during the American Revolution to maintain their neutral rights on the high seas against England.
- Augsburg, Religious Peace of (1555).** Charles V granted tolerance to Lutheran princes and cities in Germany.
- Bering Sea Arbitration Treaty (1891).** To arbitrate the right of the United States to control the seal fisheries of Bering Sea. The arbitration at Paris, 1892, decided that the United States had no jurisdiction beyond the three-mile limit.
- Berlin, Congress of (1878).** Revised treaty of San Stefano in Turkey's favor; Bulgaria given Christian government under Turkish rule; Montenegro, Serbia, and Rumania made independent.
- Berlin Act (1884-85).** International conference held under presidency of Bismarck with delegates from thirteen European powers and the United States. It determined sphere of influence in Africa.
- Brest-Litovsk (1918).** Between Germany and Russia, terminating first World War hostilities.
- Brétigny (1360).** Between France and England; end of first period of Hundred Years' War; Edward III renounced claim to French crown, receiving Guienne, Gascony, and other territories in full sovereignty.
- Bucharest (1913).** Closed second Balkan War; Bulgaria ceded territory to Serbia, Greece, Rumania, and Turkey.
- Burlingame (1868).** Between United States and China; provided for free migration of people from one country to the other.
- Cambrai, League of (1508).** Formed against Venice by the Pope, the Empire, France, and Spain when Venice was fighting the advance of the Turk.
- Cambrai, Peace of (1529).** Emperor Charles V forced France to give up its claim in Italy, Flanders, and Artois.
- Campo Formio (1797).** Between France and Austria after Napoleon's first campaign in Italy; Austria lost Netherlands and Lombardy to France.
- Chinese Treaty (1844).** See American-Chinese Treaty.
- Clayton-Bulwer Treaty (1850).** Between Great Britain and the United States providing that neither should have exclusive control over any canal built through Central America.
- Concordat of Worms (1122).** Between Pope Calixtus II and Emperor Henry V settling disputes over investiture.
- Constance, Peace of (1183).** Emperor Frederick Barbarossa acknowledged the Lombard cities' rights of self-government.
- Customs-Union or Zollverein of Germany (1830).** Started on a small scale by Prussia in 1819, it was extended to all the German states except Austria by 1830. No tariff was charged between the countries.
- Florida Purchase (1819).** United States bought Florida from Spain, paying \$5,000,000 for it; fixed boundary of Louisiana.
- Frankfort (1871).** Closed Franco-Prussian War; France ceded Alsace and much of Lorraine and \$1,000,000,000 indemnity to Germany.
- Ghent (1814).** Closed British-American War of 1812.
- Guadalupe-Hidalgo (1848).** Closed United States-Mexican War; Mexico renounced all claim to Texas and ceded New Mexico and California to United States in return for \$15,000,000.
- Havana, Act of (1940).** Adopted at a meeting of the ministers of foreign affairs of the twenty-one American republics. Agreed that any transfer or attempt to transfer any European colony or possession in the Western Hemisphere to another non-American power would not be permitted and that if such an attempt were made the territory involved would be taken over and administered by an inter-American body.
- Hay-Pauncefote (1901).** Between United States and Great Britain; abrogated Clayton-Bulwer Treaty; allowed United States to build and fortify Panama Canal although maintaining its neutrality.
- Holy Alliance (1815).** Declaration of Christian brotherhood signed first by sovereigns of Russia, Austria, and Prussia, then by all European powers except Great Britain, Pope, and Turkey; never effective; often confused with Quadruple Alliance, or Grand Alliance (Russia, Austria, Prussia, and Great Britain), which dominated Europe.
- Hubertueburg, Treaty of (1763).** Settled the European part of the Seven Years' War. Austria definitely ceded Silesia to Prussia.
- Jay's Treaty (1794).** "Treaty of amity, commerce, and navigation" between the United States and Great Britain; provided for three arbitration commissions to settle the St. Croix River boundary, the claims of British creditors, and claims for illegal seizure of American vessels by British cruisers.
- Kafnar, Union of (1397).** Denmark, Sweden, and Norway were united under one ruler.
- Kanagawa (1854).** See Perry's Treaty.
- Kellogg-Briand (1928).** Agreement to renounce war as an instrument of national policy and to settle all disputes by pacific means; signed at Paris by fifteen nations; later signed by all important nations of the world.
- Kutchuk-Kainardji (1774).** Between Turkey and Russia; gave Russia powerful position on the Black Sea.
- Lateran (1929).** Between the Papacy and the kingdom of Italy settling a 59-year-old dispute over papal lands. Italy recognized sovereignty of State of Vatican City; Vatican abandoned its extensive territorial claims receiving monetary compensation; relations between Church and State in Italy regulated.
- Lausanne (1912).** Between Turkey and Italy at close of Turko-Italian War; Tripoli ceded to Italy.
- Lausanne (1923).** Re-established peace between Turkey and Greece; drastically revised Treaty of Sèvres in Turkey's favor, Turkey recovering eastern Thrace to the Maritza River; provided for compulsory exchange of populations between Greece and Turkey.
- Lima, Declaration of (1938).** Adopted at the Eighth Pan American Conference of the twenty-one American republics. Affirmed the solidarity of the American Continent against all foreign intervention or attack.
- Limerick, Treaty of (1691).** William III of England guaranteed to Ireland its rights after the rebellion.
- Little Entente (1920).** An alliance between Czechoslovakia and Yugoslavia formed in 1920 and later joined by Rumania.
- Locarno (1925).** Seven peace and arbitration treaties, including: treaty of mutual guaranty by Great Britain and Italy of the Franco-German and Belgio-German frontiers; arbitration treaties between Germany and Poland and Germany and Czechoslovakia, also between Germany and Belgium and Germany and France; a Franco-Polish and a Franco-Czechoslovakian treaty for mutual assistance in case of attack by Germany. Granted feeling of security to European countries for several years.
- London (1913).** Between Balkan States and Turkey; restricted Turkey to Constantinople and small adjoining territory.
- London, Secret Treaty of (1915).** Secret agreement between France, Great Britain, Russia, and Italy by which Italy entered the first World War on the side of the Allies and was promised in return territorial additions in southern Europe and in Africa.
- London Naval (1930).** Agreement signed by United States, Great Britain, and Japan to limit naval armaments. Expired 1936.
- London Naval (1936).** Signed by Great Britain, France, and the United States. Japan attended opening of the conference but withdrew. Supplementary pacts were signed by Germany and Russia with Great Britain in 1937. Agreed to exchange advance information on ship construction, to stop construction on large cruisers, and to accept qualitative limitations on armaments. "Escape" clauses gave signatories power to modify treaty restrictions. Supplemented Washington Treaty (1922) and London Naval Conference (1930).
- Louisiana Purchase (1803).** United States purchased Louisiana territory from France for \$15,000,000.
- Lublin, Treaty of (1569).** Union of Poland and Lithuania which lasted until 1920.

(Continued on next page)

SOME HISTORIC TREATIES AND ALLIANCES—Continued

- Lunéville (1801).** Between France and Austria; confirmed treaty of Campo Formio; France received land to left bank of Rhine.
- Methuen, Treaty of (1703).** Treaty between England and Portugal which made them allies for many years.
- Nanking (1842).** Between Great Britain and China; closed Opium War; Hong Kong ceded to Great Britain.
- Neuilly (1919).** Between Entente Allies and Bulgaria after first World War; large areas of Bulgaria ceded to Rumania, Serbia, and Greece.
- Nicaragua Canal Treaty (1884).** Nicaragua granted to the United States the right to construct a canal through its territory.
- Nimwegen, Peace of (1678-79).** Series of treaties that put an end to hostilities between France and Holland—treaties between France and Holland; France and Spain; the Emperor and France and Sweden; and Holland and Sweden. France received Franche-Comté and annexed Lorraine.
- Nystad (1721).** Between Russia and Sweden; territory along Gulf of Finland conquered by Peter the Great ceded to Russia.
- Oregon Boundary (1846).** Between United States and Great Britain; settled Canadian boundary from Rocky Mountains westward.
- Panama, Declaration of (1939).** Adopted at a meeting of the ministers of foreign affairs of the twenty-one American republics. Declared a zone of American neutrality of from 100 to 300 miles wide in the waters, south of Canada, adjacent to the American Continent, in which belligerents were forbidden to commit any act of war.
- Panama Canal Treaty (1903).** United States leased from the Republic of Panama a strip of land ten miles wide for the construction of the canal. United States paid \$10,000,000 in gold coin and agreed to an annual rental of \$250,000 for 99 years, beginning 1913. Independence of the Republic of Panama guaranteed by the United States.
- Paris (1763).** Closed Seven Years' War (French and Indian War in America); France lost bulk of her American possessions to Great Britain. Louisiana was ceded to Spain, Florida to England.
- Paris, Treaty of (1778).** France pledged her aid to the United States in the American Revolution. The United States promised to protect the French West Indies in time of war. This treaty was broken by Washington's Neutrality Proclamation in 1793.
- Paris (1783).** Closed American Revolutionary War.
- Paris, Second Peace of (1815).** Ended Napoleonic wars. Concluded between France and the Allies. France restricted to boundary of 1790; forced to pay large indemnity and to restore art treasures taken from other European countries.
- Paris (1856).** Closed Crimean War between Russia on the one hand and Turkey, France, Great Britain and Sardinia on the other; integrity of Ottoman Empire guaranteed by the powers.
- Paris (1898).** Closed Spanish-American War; Cuba liberated; Puerto Rico, Guam, and the Philippines ceded to United States in return for \$20,000,000.
- Paris, Part of (1233).** See Kalisz-Briand Treaty.
- Partition of Poland (1772, 1793, 1795).** Three treaties in which Russia, Austria, and Prussia divided Poland between themselves.
- Perry's Treaty (1854).** Japan agreed to open certain ports to the United States; ended Japan's isolation.
- Portsmouth (1905).** Closed Russo-Japanese War; greatly increased power of Japan.
- Prague, Peace of (1866).** Between Prussia and Austria; Prussian territory increased; Austria cut off from Germany.
- Pressburg (1805).** Between France and Austria; Austria made large cessions to France and recognised Napoleon as king of Italy.
- Pretoria (1902).** Closed Boer War; Transvaal and Orange Free State lost their independence, becoming colonies of Great Britain; also called Peace of Vereeniging, from place where conference was held.
- Pyrenees, Peace of (1659).** Between France and Spain; Louis XIV of France married Spanish princess Maria Theresa and received greater part of Artois and certain Belgian fortresses.
- Rapallo (1920).** Settled controversy between Italy and Yugoslavia over Fiume, giving it status of sovereign city.
- Rastatt (1714).** Supplemented Treaty of Utrecht. Signed by Austria and France. Austria received Spanish Netherlands. France received small territorial grants and privileges from Germany.
- Riga (1921).** Between Russia and Poland; Poland received 44,000 sq. mi. of territory.
- Rush-Bagot (1817).** Agreement between the United States and Great Britain. Signed by Richard Rush, then acting secretary of state for the United States, and Charles Bagot, British minister at Washington. Reduced naval forces of the two countries on the Great Lakes and set forth a policy of peace between Canada and the United States.
- Ryswick (1697).** Between France and England, Spain, Holland, and Holy Roman Empire; France received Alsace (ended King William's War in American colonies).
- Saint-Germain (1919).** Between Austria and Entente Allies after first World War; broke up old Austro-Hungarian monarchy, enormously reducing Austria's boundaries; recognized independence of Yugoslavia, Czechoslovakia, Poland, and Hungary.
- San Stefano (1878).** Closed Russo-Turkish War; provided for large cessions of Turkish territory; later abrogated.
- Sèvres (1920).** Between Turkey and Entente Allies after first World War; deprived Turkey of over half its population and two-thirds of its land; later abrogated.
- Shimonoseki (1895).** Between Japan and China; China acknowledged independence of Korea; ceded island of Formosa and paid large indemnity to Japan.
- Swiss Cantons, League of (1291).** Uri, Schwyz, and Unterwalden united against the Hapsburgs and established a republic. In 1309 their independence was recognized by the Emperor in charters.
- Tacna-Arica (1929).** Settled Peru-Chile controversy over provinces of Tacna and Arica, awarding Tacna, together with 40,000,000 and public works to Peru; Arica to Chile.
- Thorn, Second Peace of (1466).** Between Poland and Teutonic Knights; Teutonic Knights in Prussia became subject to Poland, West Prussia ceded to Poland and East Prussia became Polish fief.
- Tilsit, Peace of (1807).** Treaties between France and Russia; and between France and Prussia; Prussia stripped of large territory; mastery in Europe divided between France in west and Russia in east. Grand Duchy of Warsaw established.
- Trianon (1920).** Between Hungary and Entente Allies after first World War; established Hungarian boundaries with large cessions to border states.
- Triple Alliance (1882).** Italy joined the Dual Alliance of Germany and Austria-Hungary which had been formed in 1879.
- Triple Entente (1907).** Diplomatic union of Great Britain, France, and Russia to counterbalance Triple Alliance, grew out of Dual Alliance (France and Russia) of 1891.
- Troyes (1420).** Interrupted Hundred Years' War between England and France; Henry V of England to marry Katherine of France and to succeed to French throne on death of Charles VI.
- Turin, Treaty of (1860).** Victor Emmanuel of Savoy, King of Sardinia (and later of Italy) granted to Napoleon III of France, Nice and a part of Savoy in return for Napoleon's aid against Austria in 1859.
- Utrecht, Treaty of (1713).** Closed War of Spanish Succession (Queen Anne's War); crowns of France and Spain separated; England received Gibraltar, Nova Scotia, and Newfoundland.
- Utrecht, Union of (1579).** Northern Netherlands provinces declared their independence of Spain.
- Verdun, Partition of (843).** Divided Charlemagne's empire among his three grandsons; western third developed into France; eastern third into Germany.
- Vereeniging, Peace of (1902).** See Pretoria Treaty.
- Versailles (1919).** Peace treaty between Germany and Entente Allies at close of first World War; Germany lost almost 48,000 sq. mi. of European territory and more than 1,000,000 sq. mi. in colonies; enormous reparations were imposed.
- Vervins, Treaty of (1598).** Philip II of Spain recognized Henry IV as ruler of France.
- Vienna (1738).** Closed War of Polish Succession; between France and Austria; Lorraine guaranteed to France.
- Vienna, Congress of (1815).** Division of Europe following overthrow of Napoleon; much of Poland given to Russia; northern Italy to Austria; Austrian Netherlands to Holland; part of Saxony to Prussia.
- Vienna (1864).** Concluded war waged by Prussia and Austria against Denmark. Denmark ceded Schleswig and Holstein. In the Seven Weeks' War (1866) between Prussia and Austria, Prussia gained sole possession of Schleswig and Holstein.
- Villafranca (1859).** Preliminary treaty which ended the Italian war waged by France and Sardinia against Austria. Italian territory given to France and Sardinia. This led to Garibaldi's war for liberation and unification of Italy. Final provisions of the treaty signed at Zurich 1859.

SOME HISTORIC TREATIES AND ALLIANCES--Concluded

Washington (1871). Between Great Britain and United States referring the *Alabama* claims and other disputes to arbitration.

Washington (1922). Series of treaties signed at conference of nine great powers at Washington, 1921-22; including (a) Five-Power Naval Treaty, providing for reduction in naval armament; (b) Five-Power Treaty restricting use of submarines and prohibiting use of poison gas; (c) Four-Power Treaty,

signed by United States, Great Britain, France, Japan, for maintenance of existing conditions in Pacific expired 1936; (d) Nine-Power Treaty relating to open-door policy of China.

Webster-Ashburton (1842). Between Great Britain and United States; settled boundary dispute between Maine and Canada.

Westphalia (1648). Closed the Thirty Years' War, the last great religious con-

test in which all powers of western Europe were more or less involved; Peace of Augsburg was confirmed and extended; Catholicism restored in Austria, Bohemia, and Bavaria; Sweden given large cessions as fields of Empire; France obtained Alsace.

Worms, Concordat (1122). See Concordat of Worms

Zollverein (1830). See Customs-Union

Zurich. See Villafranca Treaty

Trenton, Ont., Canada, port at head of Bay of Quinte 95 mi. n.e. of Toronto; pop. 6276; terminus of Trent Canal; hydroelectric, acid, and chemical works; lumber interests.

Trepang', holothurian, sea-cucumber, or bêche-de-mer, a marine animal S-67

Trepan'ning, or trephining, surgical operation consisting in removal of part of skull for purpose of relieving pressure, removing tumors, etc.

Trespass, in law, a wrong to person or property by a willful and forcible act; chiefly used to refer to unlawful entrance to another's land.

Trestle, in bridge construction B-240, 240b

Trestle table, colonial A-170, picture A-171

Trevel'yan, Sir George Otto (1858-1928), British historian, born Rothley Temple, Leicestershire, nephew of Lord Macaulay; Parliament member (1885-97); secretary for Scotland ('Life and Letters of Lord Macaulay', masterpiece of biography; 'The American Revolution'). His son, George Macaulay Trevelyan (born 1876) also known as historian of England and Italy.

Trevena, John, pen name of Ernest George Henham (born 1870), English novelist, born London; began to write at 15; spent youth in Canada as cowboy, student and poet; works show good character drawing, sardonic humor, poetic description ('Furze the Cruel'; 'Heather'; 'Granite'; 'Type's Treasure').

Treves (trève), Germany. See in Index Trier

Trevlso (trā-vē'sō) (ancient Tarvisium), Italy, city 16 mi. n. of Venice; pop. 58,000; textiles, metal ware; art center; city republic under Lombard League.

Trev'ithick, Richard (1771-1833), English engineer and inventor; built first moving steam engine inventions I-115, R-38, L-176, F-8, S-281

Tri'ad, in color C-308e

Triad, in music, a chord of three tones.

Trial and error, learning by L-79, 82, graph L-80

Trial by combat J-231

Trial by compurgation J-231

Trial by jury J-229-31. See also in Index Jury

Trial by ordeal J-231

Triangle, a musical instrument M-323, O-241, picture M-322

Triangle, in mathematics G-50-1, T-139-41

Triangle, measurement of area M-115

Triangle, instrument used in mechanical drawing for making parallel,

diagonal, and perpendicular lines, picture D-102

Triangular division, or streamlined division, in U. S. Army A-307c

Triangular pyramid, diagram G-49

Triangula'tion, method of surveying S-331-2

Trianon (trē-ā-nōn'), palaces at Versailles V-269

Trianon, Treaty of, between Allied Powers and Hungary; signed June 4, 1920; gave Hungary independence but with restricted borders: H-361-2

Triar'li (tri-ā-ri-ē), in Roman Legion A-307f

Trias'sic period, in geologic time G-40, 42, picture G-41

Tribal life F-8-12. See also in Index Family and tribal life

Tribe F-11. See also in Index Family and tribal life

American Indian I-56-7

government D-45; beginnings F-12

Triborough Bridge, New York City B-240b, table B-342

Tribunal of the waters, Spain V-268

Trib'une, Roman magistrate R-131

Tri'ceps muscle, of arm M-304, picture M-304

Tricer'atops, a three-horned prehistoric reptile A-206, picture A-207

ancestral type, picture A-209

Trichina (tri-kī'nā), a parasitic worm W-180b

safeguard against H-316

Trichinopoly (trik-i-nōp'ō-lī), town of Madras, British India, on Kaveri River; pop. 145,000; cheroots, woven fabrics, hardware, jewelry: map A-332c

Trichino'sis, a disease caused by worm W-180b

Trichoptera (tri-kōp'tēr-ā), an order of four-winged insects consisting of the caddis flies.

Triclin'ic crystals M-182

Tricolor, French national flag, color plate F-88

origin F-94

Tricus'pid valve, of heart H-258

Tri'dent, three-pronged spear carried by Poseidon P-315

Tri'dymite, a mineral of quartz and water M-182

Trier (trēr), Germany, also Treves, ancient city in western Prussia, on Moselle River; pop. 68,000; various manufactures; Imperial residence under later Roman Empire; fine Roman amphitheater, basilica, baths, and other remains; cathedral one of oldest in Germany.

Trieste (trē-ēst', Italian trē-ēs'tā), Italy, most important city on the Adriatic; pop. 255,000; T-138, map I-156

Trifo'lum, the clover genus of plants C-282. See also in Index Trefoil

Triggor-fish, heavy, deep-bodied tropical fish of family *Ballistidae*, covered with large rough scales; first dorsal fin is composed of a short stout spine, overlapped by a second, and held in place by a third, which when touched releases the first, acting in much the same manner as a safety trigger on a gun: color plate O-200c-d

Triglyph (tri'glif), in architecture, picture A-259

Trigones, stingless social bees B-77

Trigonomet'ric functions T-139, table T-140

Trigonom'etry, a branch of mathematics T-139-41

first treatise by Ptolemy P-364

Tri-HI-Y, clubs for girls Y-208

'Trilby', novel by George du Maurier (1895), dealing with artist life in Paris; heroine Trilby, a beautiful artist's model, becomes a great singer through hypnotism of Svengali.

Tril'lum, or wake robin T-141

Trilobite (tri'lō-bit), an extinct crustacean, the dominant life in the sea during the Cambrian period; the name means "three-lobe-like" and refers to the three longitudinal divisions of the upper shell: T-141

Tril'ogy, a group of 3 compositions about a single theme

dramas of Aeschylus G-172

Trim, Corporal, servant and companion to Uncle Toby in Sterne's 'Tristram Shandy'.

Trim'eter, in poetry P-269

Trimmer, Sarah Kirby (1741-1810), English writer of children's books L-159

Trimountain, early name for Boston B-202

Trine, Ralph Waldo (born 1860) American writer, born Mount Morris, Ill.; author of books on subjects related to New Thought ('What All the World's a-Seeking'; 'In Tune with the Infinite').

Trinidad, island of British West Indies, 1862 sq. mi.; pop. (including island of Tobago) 450,000; T-141-2, W-72, maps W-72c, S-208b

coast, picture W-72a

copra, picture W-72d

pitch lake A-336-7, T-141, pictures A-336, 337

Trinidad, Colo., city 78 mi. s. of Pueblo; pop. 13,223; center of stock-raising and farming interests; coal-mining and coke-manufacturing district; foundries, brick and tile works: map C-310

Trinidad, Cuba, town 45 mi. s.e. of Cienfuegos and 5 mi. from its port, Caibide; pop. 14,000; exports sugar, coffee: map C-412

Trinidad tea T-27

ü=French u, German ü; gem, go; thin, then; ñ=French nasal (Jean); zh=French j (z in azure); k=German guttural ch

Trinitrotoluol (T N T), a high explosive E-348

Trinity, doctrine of, in theology, belief that there are three persons in God or the divine nature, the Father, the Son, and the Holy Ghost Arian heresy C-232

Trinity Church, Boston B-201 architecture A-272

Trinity Church, New York, picture U-240

Trinity College, Canada. *See in Index* Toronto, University of

Trinity College, Hartford, Conn.; men; non-sectarian, but has Episcopal affiliations; founded 1823; arts and science, civil engineering.

Trinity College, Oxford O-260

Trinity College, Washington, D. C.; for women; founded 1897 (opened 1900); Roman Catholic; arts and science.

Trinity Column, monument in Vienna, picture V-298

Trinity River, Tex., flows 595 mi. s.e., entering Galveston Bay 40 mi. n. of Galveston; map T-56 dam at Fort Worth F-161 flood control at Dallas D-6 La Salle murdered here L-66

Trinity Sunday, church festival, the Sunday following Whitsunday; observed in honor of the Holy Trinity.

Trinity University, at Waxahachie, Tex.; Presbyterian; founded 1869; arts and sciences.

Triode tube, a type of vacuum tube, diagram R-22

Triplet (*trī-tē-lēt*), verse form derived from the French, consisting of eight lines, usually short, and containing only two rhymes; first line is repeated as fourth and seventh line, second line as eighth line; rhyme scheme, abaaabab; example: Dobson's 'Rose-Leaves'.

Tri'onal, a narcotic drug N-12

Triplane, an aircraft A-70

Triple Alliance, formed 1882 between Germany, Austria-Hungary and Italy: E-325, T-129

Italy and 1st World War W-152

Triple City (Hankow, Hanyang, and Wuchang, China) H-211

Triple Entente (*trī-tēnt*), agreement between France, Russia, and Great Britain formed 1907: T-129, E-325 influence of Edward VII E-190

Triple-expansion engine S-281

Triplet, in music, a group of three notes played in the time ordinarily required for two of same length.

Tri'poli, cap. and chief port of Italian Libya; pop. 100,000: L-121b, maps A-42a, b, picture L-121b rainfall L-121a

Tripoli, province of Italian colony of Libya in n. Africa: L-121b, maps A-42a, b

Leptis Magna L-121b: ruins, pictures L-121a, A-252

United States defeat pirates J-209: Decatur D-23; Lawrence L-74

Tripoli, Syria, also Tarabulus (*tā-rū-bū-lūs*), city near coast, 45 mi. n.e. of Beirut; pop. 37,000; active trade in tobacco, fruit, cotton; taken in 1109 by Crusaders after siege of 5 years; ancient ruins surrendered to Turks C-408

Tripoli powder, or tripolite, also called kieselsuhr, diatomaceous earth, or infusorial earth D-64, O-200, F-164 cleans by adsorption C-303

Tripolitania, ancient Phoenician, later Roman, colony in n. Africa; now part of Italian Libya: L-121a, b, map A-42a

Tripolite. *See in Index* Tripoli powder

Tri'poli'tza (*trē-pō-lē'tsū*), Greece, also Tripolis, town 23 mi. s.w. of Argos; pop. 14,000; capital of Morea under Turks; taken 1821 by Greek insurgents; destroyed 1825 by Ibrahim Pasha.

Triptolomus (*trīp-tō-lō-mūs*), in Greek mythology, an Eleusinian youth favored by Demeter, from whom he learned the art of agriculture which he taught to mankind; said to have invented the plow.

T'rireme (*trī-rēm*), ancient galley S-118, pictures S-125, S-159

Tristan (*trī'stān*), or Tristram, of Lyonesse, hero of Celtic legend, sent to bring Iseult (Isolde), bride of his uncle, king of Cornwall, drinks by mistake a love potion which makes him Iseult's lover Arthurian legends A-316, R-160 ivy legend I-176

Tristan da Cunha (*trīs-tān' dū kən-yā*), British islet in s. Atlantic, about midway between Buenos Aires and Cape of Good Hope; an extinct volcano, called "world's loneliest island"; 16 sq. mi.; barren and rugged, does not produce enough for its pop. of 160.

'Tristan und Isolde' (*trēs'tān unt ē-zōl'dū*), opera by Wagner W-1 Jean de Reszke as Tristan, picture O-232 story O-234

'Tristram Shandy' (full title 'The Life and Opinions of Tristram Shandy, Gentleman'), novel by Laurence Sterne; has no plot; rambles along in whimsical fashion, recording experiences and opinions; famous for wit and humor and very human characters.

Tritium, a hydrogen isotope C-169

Tritoma, a plant. *See in Index* Kniphofia

Triton (*trī'tōn*), in Greek mythology, son of Poseidon and Amphitrite, personification of roaring waters; blows a twisted seashell to calm or raise the waves; tritons usually represented with the torso of a man, the tail of a dolphin, and the forefeet of a horse.

Triton, a gastropod mollusk trumpet-shaped shell, picture S-109

Tritonia (*trī-tō-nī-ā*), a genus of perennial South African plants of the iris family. Grow to 3 ft.; leaves narrow, swordlike; flowers brilliant orange, yellow, or scarlet, in erect spikes; also called montbretia and blazing star.

Triumphal arch, pictures R-139, P-71

Triumph theme, in fine arts F-37

Triumvirate, in Roman history first P-302, C-12 second A-364

Trivandrum (*trē-vān'drūm*), city in s.w. India, 2 mi. from coast; pop. 65,000; cap. of Travancore and of Madras States Agency; colleges and old temple; noted for tolerance of all sects; map A-332a

Triv'ium, in medieval education E-172

Trobriand (*trō-brē-ānd*) Islands, group of Coral islands s.e. of New Guinea N-85

Trocadero, building in Oriental style on right bank of Seine in Paris; built 1878 for International Exposition; now a museum with comparative exhibits of sculpture and concert hall seating 6000.

Trochee (*trō-kē*), metrical foot P-269

Trochelmithes (*trōk-ēl-mīn'thēs*), a phylum of animals comprising the rotifers Z-227

Trochilidae (*trō-kī-lī-dē*), the humming-bird family.

Troels-Lund (*trōls-lūnd'*), Troels Frederik (1840-1921), Danish historian; Nobel prize winner 1915; brilliant stylist; chief work a Scandinavian history in 14 volumes.

Troezen (*trō-zēn*), ancient city of Peloponnesus, Greece; prominent in Persian wars, later ally of Sparta.

Troglodytes (*trōg-lō-dīts*), name given by ancient Greek writers to various tribes of cave-dwelling savages of debased habits; best known lived along Red Sea. *See also in Index* Cave dwellers

Tunisian village, picture S-112

Troglodytidae (*trōg-lō-dītī-dē*), the wren family of birds W-181, color plate B-139

Trogon (*trō-gōn*), a family of beautiful tropical forest birds, noted for their gorgeous plumage; 8 genera occur in South and Central America; the coppery-tailed trogon (*Trogon ambiguus*), 12 in. long, the male bronze-green and red and the female brown and pale geranium red, occurs in s. Arizona and e. Texas and is the only trogon found n. of Mexico.

Trogoniformes (*trō-gōn-ī-fōr'mēs*), an order of tropical forest birds, comprising trogons.

Trolka (*trōl-kā*), Russian sleigh drawn by three horses, pictures R-178, T-123

Troilus (*trō-lūs*), in Greek legend, son of Priam, king of Troy; in medieval legend, hero of the love story which forms basis of Shakespeare's tragedy 'Troilus and Cressida' and Chaucer's poem of same name.

Trojan horse, in modern sense, a hostile device under friendly and attractive disguise; derived from story of Wooden Horse in Trojan War: T-143-4

Trojan War T-142-3. *See also in Index* Homer; Troy Achilles A-8-9 Ajax A-95

Amazons A-140

Aphrodite aids Trojans A-227

Athena aids Greeks A-352

Hector H-268-9

legends collected in Homeric poems H-329-30

Odysseus O-204

Paris P-70

Poseidon aids Greeks P-315

'Story of the Wooden Horse' T-143-4

Troil (*trōl*), in Scandinavian mythology, one of the 'hill people', mischievous underground elves F-3

Trolley car. *See in Index* Street railway

Trolley-wire S-307, 308, C-360 composition A-132

Trollhätta (*trōl-hēt'tā*) Falls, Sweden, of Göta River S-337, 338

Trollius (*trōlī-ūs*), or globe-flower, a genus of perennials of the buttercup family, found in north temperate zone. Leaves dark green; flowers solitary, golden yellow, rarely white or purple, cuplike; common species is *T. europaeus*.

Trollope (*trōl-lōp*), Anthony (1815-82), English novelist, witty, keen-sighted chronicler of English middle-class, especially clerical, life ('Barthester Towers'; 'Doctor Thorne'; 'Framley Parsonage') Thackeray's 'Barry Lyndon' T-72

Trombone, a musical instrument H-338, 339, picture M-322

orchestra O-241

principle of M-323

range of, diagram S-198

Tromp, Martin Harpertzoon (1597-1653), Dutch admiral; defeated

- Spanish and Portuguese fleets 1639; commander in several engagements with English fleet (1652-53)
 Blake defeats, *picture* E-271
 Tromsö (*tröm-sü*), far northern village of Norway, pop. 10,000; N-176, map N-173
 Trona, a mineral form of sodium carbonate M-183
 Trondheim, Norway, also Trondhjem (*trön'yem*) (ancient Nidaros), seaport on w. coast on Trondhjem Fjord; pop. 55,000; trade in timber, fish, copper, iron; N-174, map N-173 cathedral, *picture* N-177
 Trondhjem Fjord, Norway, on w. coast, 80 mi. long, map N-173
 Troo, underground village of France C-118
 Troop, in U.S. Army cavalry A-307c
 Trope (*tröp*), figure of speech F-32-3 slang S-158
 Tropical fish F-72-3, A-234-5, *picture* A-234, color plates A-233a-b, F-72a-b
 Tropical Medicine, Liverpool School of L-166
 Tropical year, the interval of time required for the earth, or apparently the sun, to pass from the vernal equinox back again to the vernal equinox. Length in mean solar time 365 days, 5 hours, 48 minutes, 46 seconds. It is the basis for almost all later ancient and modern calendars, because it remains in step with the seasons.
 Tropic-bird, any of several species of birds belonging to the family *Phaethonidae*, found in tropical and subtropical seas of both hemispheres.
 Tropic of Cancer, *picture* E-133, maps A-332b-c, F-107-c
 winds W-112, chart W-113
 Tropic of Capricorn, *picture* E-133, map P-106-c
 winds W-112
 Tropics, or tropical zone, geographical term for region of greatest heat, bordering the equator; sometimes called the torrid zone; L-70-1, C-270a, b, E-133, diagram E-133, map P-106-c
 agriculture A-58
 Amazon basin B-226b
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 rainfall R-46
 storms S-298
 winds W-112, diagram W-113
 Tropopause, belt of air, chart A-63
 Troposphere, belt of air B-22, chart A-63
 Tros, in Greek mythology, king of Phrygia; gave name to Troy, which his son Ilius founded
 father of Ganymede G-5
 Trossachs (*trös'aks*), a wooded glen in Perthshire, Scotland, between Loch Achray and Katrine; Ben Venue and Ben A'an rise on either side; its beauty has been immortalized by Scott in 'The Lady of the Lake', 'Rob Roy'.
 Trotter, Job, Jingle's servant in Dickens' 'Pickwick Papers', *picture* D-67
 Trotting horse, speed records H-344
 Trotwood, Betsey, in Dickens' 'David Copperfield', David's kind, talkative great-aunt.
 Trotzky, Leon (1879-1940), Russian revolutionary leader T-144, R-190
 Troubadours (*trü'bä-dörz*), wandering singers R-127, M-310
 Troubetzkoy (*trü'bets'koi*), Paul (1866-1988), Russian sculptor; influenced by Rodin
 bust of Tolstoy, *picture* S-62
 Troubetzkoy, Princess. See in Index
 Rives, Amélie
 Trousers D-109
 Trout, a food fish T-145, F-75, *picture* F-68
 Trout lily, or dogtooth violet D-85
 Trouvères (*trü-vër'*), name for wandering minstrels in northern France R-127
 Trouville (*trü-vël'*), French fishing and fashionable resort town on English channel near Deauville; pop. about 6000.
 'Trovatore, Il' (*el trö-vä-tö'rä*), opera by Verdi V-282
 story O-234
 Trowbridge, John Townsend (1827-1916), American novelist and poet, born Ogden, N. Y.; excelled in writing boys' stories ('Cudjo's Cave', Jack Hazard series, 'The Prize Cup', novels; 'Darius Green and His Flying Machine', verse).
 Trowbridge, England, a market town in Wiltshire; manufactures textiles; pop. 12,000; map E-270a
 Trowel, a tool T-110
 Troy, or Il'ium, ancient city in n.w. Asia Minor famous in Greek legend; scene of Trojan War: A-27, maps A-25, B-18. See also in Index Trojan War
 center of Aegean civilization A-27
 excavations T-143; Schillemann S-39, 40
 horse of, story T-143-4
 Troy, N.Y., "collar capital" of U.S.; pop. 70,304; T-145, map N-114
 Erie Canal H-350, C-69
 first engineering school in U.S. E-182
 Troyes (*trüd*), France, town on Seine River, 90 mi. s.e. of Paris; pop. 58,000; makes hosiery
 medieval fair F-3
 treaty of (1420) H-358
 Troyon (*trüd-yön'*), Constant (1810-65), French painter of the Barbizon school, by many critics considered the foremost animal painter of modern times; his rich and glowing landscapes include animals as an integral part ('Gooey Girl', 'Holland Cattle', 'Return to the Farm', 'Oxen', 'Going to Work', 'On the Road')
 'Going to Market', *picture* P-23
 Troy weight, table W-67
 origin F-3
 Truce, suspension of warfare
 armistice differs from A-303
 flag of I-109
 Truce of God, in feudal times, prohibition by church of private war on holy days and seasons, and certain week-days.
 Truck A-388. See also in Index Motor truck
 Truckee-Carson project N-76
 Lahontan dam, *picture* I-149
 Truckee River, small stream in California and Nevada connecting Lake Tahoe with Pyramid Lake: map N-77
 Truck farming, cultivation of garden products. See also in Index Gardens and gardening
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 electric power equipment A-51
 Florida F-111-12
 New York N-120
 soil suitable for L-61b
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 United States regions, map U-191
 Virginia V-304
 Trudeau (*trü'dü*), Edward Livingston (1848-1915), physician, pioneer in treatment of tuberculosis; born New York City; educated Paris and New York City; attacked by tuberculosis, went to Adirondack Mts.; founded at Saranac Lake the Adirondack Cottage Sanatorium, first U. S. institution for open-air treatment of tuberculosis; first president National Tuberculosis Association.
 Trudgen crawl S-345
 True bill, in law J-230
 True rib. See in Index Rib
 Truffle, a fungus M-307
 pigs trained to find H-315
 Trujillo y Molina, Rafael Leonidas (born 1891), dictator (with official title, "Benefactor") of Santo Domingo; president 1930-38; S-28
 Truk (*trük*) Islands, group in e. cent. Caroline Islands; about 50 sq. mi.; pop. 17,000; key to easternmost Japanese naval defenses in Pacific: map P-10b
 Truman, Harry S. (born 1884), senator, born Lamar, Mo.; army officer 1st World War; U.S. senator from Missouri after 1934; became chairman of Senate Committee to Investigate the National Defense Program, 1941; *picture* H-310d
 Trumbull, John (1750-1881), American judge and political satirist
 'McFingal' A-177
 Trumbull, John (1756-1843), American painter ('Bunker Hill', 'The Death of Montgomery')
 paintings by, *pictures* R-81, R-91
 Trumbull, Jonathan (1710-85), American colonial statesman, governor of Connecticut C-341
 "Brother Jonathan" N-143
 Trumpet, a musical instrument H-338, 339, *picture* M-322
 Trumpet-creeper, or trumpet-vine, a genus (*Campsis*) of woody vines of the bignonia family climbing by aerial rootlets, with showy trumpet-shaped orange and scarlet flowers, which attract humming-birds; frequently cultivated in gardens.
 Trumpeter pigeon P-216
 Trumpeter swan S-334, B-145b
 Trumpet-fish, attenuated sooty fish (*Aulostomidae*), ending in a long snout bearing feeble jaws; species abundant in the West Indies, Polynesia, and Asia; used as food.
 Trumpet narcissus N-11
 Trumpet shell S-107, *picture* S-109
 Trumpet-vine. See Trumpet-creeper
 Trundle, Mr., a character in Dickens' 'Pickwick Papers'.
 Trundle-bed A-169, *picture* A-170
 Trunk, a prolonged, flexible snout
 elephant E-245-6, 248, *pictures* E-244-6, 249
 elephant seal S-70
 tapir T-10, *picture* T-12
 Trunkfish, a fish of the family *Ostracidae*, having the body enclosed in a bony box leaving only the jaws, fins, and tail free. They are slow, brilliantly colored, four inches to a foot long, common in waters of West Indies. Those members of group with two horns over eyes are known as cow-fish.
 Truro, Nova Scotia, farming and dairying center on Salmon River, 2 mi. from head of Cobequid Bay, on Bay of Fundy; pop. 7901; Nova Scotia normal and agricultural colleges: map C-500
 Truss, in architecture and in engineering
 bridge B-240, *pictures* B-241, 242
 skyscraper construction A-273
 Trussing, in falconry F-7

ü=French u, German ü; gem, go; thin, then; ñ=French nasal (Jean); zh=French j (z in azure); x=German guttural ch

Trust, municipal, Glasgow system G-100

Trust and savings bank T-147-8

Trusts, industrial, large business combinations, sometimes monopolistic T-145-7, C-371-2. *See also in Index* Government regulation of industry; Monopoly beginnings T-145-6, A-314, H-228, 229, M-15

European combines and cartels T-147

first in America U-234

New Jersey N-93

regulation: Clayton Act T-146-7; Federal Trade Commission F-22; Sherman Anti-Trust Act H-229, M-15, T-146, 147; Webb-Pomerene Act and NIRA modify T-147

Standard Oil Company R-122, T-146

Theodore Roosevelt's policy R-151: "trust buster," cartoon U-247

Trusts, investment T-147

Trusts and trustees, legal terms; a trustee is a person or company appointed to administer property (the "trust") for another's benefit T-147-8. *See also in Index* Trusts, industrial; Trusts, investment bank department B-43, T-148 bankruptcy B-38 bondholders' S-291 collateral trusts S-291 college board of trustees U-258 inherited estates W-98 legal origin T-145 philanthropic foundations P-161-2 trust companies T-147-8

"Truth drug." *See* Scopolamin

"Truth forever on the scaffold" A-178

Truxtun, Thomas (1755-1822), naval officer, born near Hempstead, N.Y.; privateer during American Revolution; 1794 made captain in new American Navy; captain of *Constellation* during naval war with France: N-566

Try'on, Dwight William (1849-1925), American landscape painter, born Hartford, Conn.; painted chiefly New England scenes.

Tryon, William (1729-88), colonial governor of North Carolina N-159

Trypanosomes (*trīp'ā-nō-sōmz*), various single-celled parasitic animals sleeping sickness germ, picture G-78

Trypanamide, a remedy for sleeping sickness T-148

Tryp'sin, a protein-digesting enzyme D-68

Tsar, or czar, title of Russian emperor I-175

Tsaritsyn (*tsā-rēt'sin*), Russia. *See in Index* Stalingrad

Tschalkovsky (*chī-kōf'skē*), Peter Ilyich (1840-93), Russian composer T-148, M-315

Tsetse (*tsēt'sē*) fly, carrier of sleeping sickness T-148

buffaloes avoid A-203

Congo A-36

Mozambique M-294

Tsia, or Sia, a pueblo of the Keres Indians on Rio Jemez, N. Mex.

Tsien-tang, river of China in province of Chekiang; enters Bay of Hangchow "bore" at Hangchow H-210

Tsimshian (*tsim-shī-ān'*), a group of Indian tribes living in British Columbia and adjacent islands I-56

Ts'in (*chīn*), or Ch'in, ancient Chinese dynasty (249-207 B.C.); most important ruler Shi Huang-ti C-221

Tsinan (*tsi-nān'*), China, also Tsinanfu, capital of Shantung, 3 mi. from Yellow River; pop. 500,000; silk, precious stones, glass; university; on Tsinan-Tsingtao railroad: S-102, map C-212

Tsine, or banteng, small ox C-102

importation forbidden Z-223

Tsingtao (*tsing-tow'*), China, also Tsingtau, treaty port in Shantung on Bay of Kiaochow; pop. 350,000: S-102, map C-212

Japan captures (1914) W-155

Tsinling (*ts'ing'ling'*) Shan, mountains in e. cent. China C-210, map C-211

Tsitsihar (*tsē'tsē'hēr'*), Manchukuo, capital of Longkiang province on Nonni River and on North Manchuria railroad connecting Hallar, Hallung, and Harbin; pop. about 80,000; distributing center for agricultural products: map M-49a

T-square, an instrument used in mechanical drawing for laying out right angles, picture D-102

Tsushima (*tsō'shē-mū*), island of Japan in Korean Strait; about 260 sq. mi.; battle of Sea of Japan fought off its coast (1905): R-198

Tsze-Hsi (*tsē shē*), or Tzu-Hsi (1835?-1908), the "Great Empress Dowager" of China and its virtual ruler for half a century; encouraged Boxer rising; last prominent reactionary of old era: C-221

Tuamotu (*tō-ā-mō'tō*), or Low Archipelago, 1800-mi. chain of atolls belonging to France, in Pacific s. of Marquesas; estimated land area, 300 sq. mi.; pop. including Gambier Islands and Makatea Island, 7000; copra, pearl shell, phosphate: P-5, map P-10c

Tuaregs (*tuā'rēgē*), nomadic tribe of Berber stock; divided into noble and slave classes; men very tall, warlike, wear face veils; trace descent through the mother: S-6

Hamitic race A-39

Tuat (*tō-ū'*), group of oases in w. part of Algerian Sahara, n. Africa.

Tuatara (*tō-ā-tā'rā*) (also tuatera), or sphenodon, a reptile L-172

classified R-78

Tuatha da Danaan' (*thp'd-hā dā dā'nān'*), cycle of Irish folk-tales S-303g, I-132

Tuba, or bass horn, a musical instrument H-338, 339, picture M-322

range of, diagram S-198

Tubo, pneumatic P-264-5, pictures P-264, H-215

mail P-317

Tube, radio. *See* Vacuum tube

Tubo, torpedo T-114

Tube, underground. *See* Subway

Tu'ber B-269

potato P-324-6

sweet potato S-341-2

Tuberculosis, a bacterial disease cattle C-106

caused by bacteria G-78, picture G-80

fight against H-254

Philippine Islands P-167

Saranac Lake sanitarium A-21

Tuberosa, a flower T-148-9

Tubiflorae, an order of flowers with tubular corollas.

Tübingen (*tü'bing-ün*), Germany, town in Württemberg on Neckar River, 22 mi. s. of Stuttgart; pop. 20,000; seat of famous university; founded in 1477.

Tubman, Harriet (1823-1913), American Negro reformer; born into slavery she escaped to the North in 1849 where she enlisted aid of friendly Quakers and abolitionists in organizing methods for hiding and transporting fugitive slaves.

Tubual (*tō-bā-t*), Islands, or Austral Islands, in s. Pacific; s.e. of Cook Islands; 115 sq. mi.; pop. 8000; belong to France: map P-10c

Tubulidenta'ta, an order of mammals having teeth with parallel vertical canals Z-229

aardvark A-2

Tuck, Friar, vagabond friar in Robin Hood legends; appears in 'Ivanhoe' as the 'holy clerk of Copmanhurst': R-118, picture R-119

Tucson (*ty-sōn'*), Ariz., health and resort center 69 mi. n. of Mexican border, on Santa Cruz River; pop. 36,818; farming, cattle-raising, and mining district; state university: map A-289

founded A-290

plant life near by, picture E-145b

Tucumán (*tō-kp-mān'*), Argentina, capital of province of Tucumán, in n.; pop. 140,000; commercial and railroad center; university; declaration of independence from Spain signed by Plata provinces 1816: maps A-279, S-208c

Tucumcari, New Mex., town 130 mi. s.e. of Santa Fe; pop. 6194; seat of Quay County; trade center and shipping point in farming and cattle-raising region: map N-97

Tudor, Antony (born 1809), dancer and choreographer, born London; with Ballet Club and Vic-Wells Ballet, London; joined Ballet Theatre U. S. 1939; ballets include 'Lilac Garden', 'Flair of Fire', 'Roméo and Juliet', 'Dim Lustré'.

Tu'dor, House of, English royal family T-149. *See also in Index* names of rulers

list of rulers E-270

Tudor, Owen (died 1461), handsome Welsh border lord, who gave name to house of Tudor: T-149

Tudor rose T-149

Tudor style, in architecture, transition between Gothic and Elizabethan styles in England; in ecclesiastical architecture it was the latest form of the perpendicular Gothic; secular buildings are characterized by large rectangular windows and bay windows: A-270

furniture I-100, picture I-98

Hampton Court, picture B-272

Tuesday, 3d day of week; named for Tiw or Tyr, Teutonic god of war.

Tu'fa, a cellular limestone L-138

Tufa, or tuff, volcanic ash thrown out by erupting craters; often forms a soft rock when deposited in sea or saturated with water; used for building; covered Pompeii; Roman catacombs built in it: M-185

Tuffet, colonial child's stool A-171

Tufted titmouse T-100

Tufts, James Hayden (1862-1942), American philosopher, born Monson, Mass.; professor University of Chicago 1892-1930 ('Ethics', with John Dewey, 'Our Democracy'; 'Real Business of Living').

Tufts College, at Medford, Mass.; founded 1852 (opened 1854) by Universalists; now non-sectarian; liberal arts, engineering, theology, graduate work; medical and dental schools in Boston.

Tu'fu (*tō fō'*) (713-770), Chinese poet; after years of wandering became court favorite; fell into disfavor, suffered privations; wrote beautiful lyrics; considered by many China's supreme poet ('Tu Fu, Wanderer and Minstrel').

Tugela (*ty-gā'lā*), river of Natal, South Africa; length 300 mi.: picture S-201

Tuggurt (*ty-ggr't*), or Tonggourt (*tō-ggr't*), Algeria, oasis in Sahara; pop. 13,000: map A-127

Tu'grik, monetary unit of Mongolia,

- worth about 62 cents, coined in silver; equals 100 mungos.
- Tugwell, Rexford Guy** (born 1891), American economist, born Sinclairville, N. Y.; professor economics, Columbia University; undersecretary agriculture 1934-36; co-author Agricultural Adjustment Act; appointed governor of Puerto Rico 1941 ('Industry's Coming of Age'; 'The Battle for Democracy').
- Tulleries** (*tuwl-ré*), former royal palace in Paris on the Seine River; begun about 1564 by Catherine de' Medici; Marie Antoinette and Louis XVI imprisoned here before they were guillotined; destroyed by Communists in 1871; famous gardens are now a public park.
- Tula** (*tq'tá*), manufacturing city in cent. European Russia, 110 mi. s. of Moscow; pop. 275,000; maker of firearms since 16th century; famous for samovars and other metal ware; Leo Tolstoy born near by at Yasnaya Polyana; map E-326e
- Tulagi** (*tq-lá'gá*) Island. See in Index Solomon Islands
- Tulane** University of Louisiana, at New Orleans, La.; non-sectarian; founded 1834; arts and science, engineering, architecture, law, medicine, pharmacy, commerce, education, music, design, graduate work; Newcomb College, for women.
- Tularem'la**, or rabbit fever, named from Tulare County, Calif., where it was discovered (1910) by U. S. Public Health Service; infectious disease of wild rabbits, quail, opossums, deer, and other wild game animals, recognized by whitish spots on liver and spleen on 3d or 4th day of illness; transferred to man by contact of liver or blood with open cut; symptoms similar to those of flu, and ulcerous sore. Physicians recommend wearing rubber gloves for cleaning of game, liberal use of soap, water, and disinfectant, thorough cooking.
- Tu'lip**, flower of lily family T-149 bulb structure B-269
larges as tree A-371
Michigan field, picture M-154a
Netherlands N-68, 69, pictures N-69 when to plant G-7
- Tulip tree**, or whitewood, tree of magnolia family T-149-50, pictures T-132, 134, 135
related species in China T-136 winged seed S-74
- Tulip warc**, pictures P-335, A-173
- Tull, Jethro** (1674-1741), English farmer and writer, born Berkshires County ('Horse-Hoeing Husbandry, or an Essay on the Principles of Tilling and Vegetation', first published 1733); A-59-60
- Tulle** (*tül*), picturesque town in s. France, 106 mi. s.w. of Clermont-Ferrand; pop. 16,000; fine 15th-century cathedral; from Tulle first came fabric of that name.
- Tulle** (*tül*), fine silk net with softer finish than malines; named from Tulle, France.
- Tullius, Servius** (578-534 B.C.), 6th king of Rome R-129
- Tul'iver, Maggie**, heroine of George Eliot's 'Mill on the Floss' N-182
- Tulliver, Tom**, in George Eliot's 'Mill on the Floss' E-252
- Tul'ius Hostili'us**, Roman king R-129
- Tully, Jim** (born 1891), writer, born near St. Marys, Ohio; was farm laborer, tramp, reporter; autobiographical works, 'Beggars of Life' and 'Men I Remember'; also wrote 'Jarnegan' and 'Laughter in Hell'.
- Tul'sa**, Okla., railroad and manufacturing city in n.e. on Arkansas River; pop. 142,157: T-150, map O-216, picture O-217
Boston Avenue Methodist Church, picture O-218
rapid growth O-218
reservoir for water supply T-150, picture O-219
- Tulsa**, University of, at Tulsa, Okla.; founded 1894; arts and sciences, petroleum engineering, business administration, fine arts, graduate school.
- Tumacacori National Monument**, Arizona N-22d
- Tumble-bug**, or dung beetle, a beetle B-83, picture B-81
- Tumbler lock** L-176, picture L-176
- Tumbler pigeon** P-216, picture P-217
- Tumbleweed**, any coarse annual weed in which the plant branches into a globular form which in the fall breaks off at the roots and rolls before the wind dispersing its seeds as it travels; name is given to several species of tumbling pigweeds; Russian thistle is another example: S-74
- Tumen** (*ty-mén'*) River, Korca, rises in northern mountains, flows along northern boundary between Korea and Manchuria and into Sea of Japan; one of Korea's few navigable rivers: map M-49a
- Tumor**, a swelling in any part of the body resulting from abnormal growth of new tissue; two types: non-malignant (or benign), does not spread to other parts of body, not dangerous in itself; malignant (or cancerous), spreads widely, often fatal.
- Tump-line**, device used by Indians when carrying heavy loads I-62, picture I-58
- Tu'na fish**. See in Index Tunny
- Tunbridge Wells**, England, inland watering place on border of Kent and Sussex, 30 mi. s.e. of London; pop. 36,000; medicinal springs; large trade in Tunbridge ware.
- Tun'drus**, Arctic plains P-200, S-191b
Asia A-325, map A-332a
Europe B-319, picture R-179
North America N-151-2, map N-150a; Canadian barren lands L-72
soil S-191b
- Tung oil tree**, tropical tree (*Aleurites fordii*), of spurge family, native to cent. Asia but cultivated in extreme s. U.S. Grows to 25 ft.; crown spreading; leaves oval, sometimes have 8 lobes, to 5 in. long; flowers white, tinted with red, in loose flat clusters. Fruit, smooth, 2 in. to 3 in. across, yields tung oil or China wood oil. Trees begin to bear nuts when 3 to 6 yrs. old: picture P-245 oil F-19, P-32a
- Tungstate**, a salt of tungstic acid (H₂WO₄) T-150
mineral forms M-183
- Tung'sten**, a heavy metallic element T-150, C-176, table C-168
alloys: carbide A-131; steel A-131, T-150; thorium-tungsten A-133
amount used in electric lights E-235
electric light filaments E-234, T-150
electronic current emitted E-243
ore T-150, M-183; reduction from, picture C-180
producing regions T-150: Bolivia B-170; Mexico M-141
weight I-134
X-ray tubes, pictures X-198, X-202
- Tung'stic acid**, tungstic oxide combined with water; forms salts called tungstates: T-150
- Tunguses** (*ton-gg'séz*), Ural-Altaic people of Siberia and Mongolia; include Tungus proper, Manchus racial affinity, diagram R-9b
- Tu'nic**, Greek garment D-106
- Tunica** (*tá'ní-ká*), a small genus of annual and perennial plants of the pink family, native to the Mediterranean region. Low-growing with wiry stems and narrow, grass-like leaves; flowers small, in clusters similar to members of genus *Dianthus*, pink, lilac, or white; tunic-flower or coat-flower is *T. saxifraga*, used in rock gardens.
- Tu'nicates**, sub-phylum of animals resembling primitive vertebrates.
- Tuning**, in radio R-18-19, E-230
condenser R-18-19, diagram R-21
- Tuning fork**, a steel fork giving a definite pitch when struck, picture M-322
- Tunis**, John Roberts (born 1889), American writer, born Boston, Mass.; sport stories from unusual angles ('The Iron Duke'; 'The Duke Decides'; 'Tho Kid from Tompkinsville').
- Tunis**, capital of French protectorate of Tunisia; pop. 220,000: T-151, maps A-42a, A-127, picture T-151
meat market, picture F-142
- Tunisia** (*tá-nísh'i-á*), or **Tunisia** (*tí-nísh'i-á*), a French protectorate in North Africa, on Mediterranean coast, o. of Algeria; 48,300 sq. mi.; pop. 2,600,000; cap. Tunis: T-151, maps A-127, A-42a
Carthage C-88-9
government T-151
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shelter, picture S-112
- Tunnels** T-152-4. See also in Index
Aqueducts; Subway
Chicago's freight tunnels C-189
Columbia River C-315
Moffat Tunnel, Colorado D-55, T-154
New York City T-152, 154, N-131, 133, pictures N-131, 134, C-241, T-152, 153
rounded roofs, reason for A-249
Rove Tunnel F-174
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Simplon Tunnel, Switzerland S-349
smoke and fumes, control A-385-6
waterworks W-53, picture W-54
wind tunnel, picture A-79
world's most famous T-154
Zion-Mount Carmel highway, Utah, picture U-285
- Tunnols**, in mines M-188
- Tunney** (*tún'i*), Gene (James Joseph) (born 1898), American boxer, born N. Y. City; retired from ring 1928 ('Man Must Fight'): B-211-12
- Tun'ny**, tuna, or giant albacore, also horse mackerel, fish T-154-5
ancient Greeks G-154
- Tuolumne** (*tuól'úm-né*) River, in Calif., rises at base of Sierra Nevada Mountains, flows s.w. to join San Joaquin River 25 mi. s. of Stockton
Hetch Hetchy Valley Y-208
- Tupelo** (*tq'pé-ló*), national battlefield site in Mississippi; established 1929; Civil War battle.
- Tupelo**, a name applied to the black gum, tupelo gum, and ogeche tupelo trees, and to the wood of all of them: G-188
- Tupelo gum**, or cotton gum, a tree (*Nyssa aquatica*) of the tupelo family, native to swampy regions from Virginia to Texas. Grows to 100 ft. Trunk tapers from swollen base; crown often pyramid-shaped. Bark thin, with shallow, vertical ridges. Leaves oval, toothed, dark green, shiny above, downy beneath. Fruit plumlike, 1 in. long, dark purple. Sometimes called water tupelo, swamp gum, and large tupelo.

ü=French u, German ü; gsm, gó; thin, then; n=French nasal (Jean); zh=French j (z in azure); k=Gorman guttural oh

Tupi (*tp-pé*'), early group of Indian tribes found in South America e. of Andes; language survives among tribes of La Plata River region: S-206

Tupper, Sir Charles (1621-1915), Canadian statesman T-155

Tupper, Sir Charles Hibbert (1655-1927), Canadian statesman; son of above; British agent in Bering Sea dispute.

Tupper, Martin Farquhar (1810-89), English author ('Proverbial Philosophy', moralizing blank verse).

Turaco (*tp-rú-kó'*), a medium-sized fruit-eating bird of Africa; allied to cuckoos; head tufted green pigment in feathers B-131

Turban, head-dress worn in oriental countries; consists of cloth wound around close-fitting cap, or sometimes around the head

Afghan, *picture* A-30

Algerian, *picture* A-128

Arabian, *picture* A-32, A-241, H-343

Balinese, *picture* E-142f

Burmese, *picture* B-278

Chinese, *picture* C-217

Indian, *pictures* I-34, 38

Turbinate bones, or turbinals, bony projections into the nasal cavity supporting the olfactory (smelling) nerves and the mucous membranes; consist in human beings of 3 pairs, the superior, the middle, and the inferior turbinals in facial structure S-156

Turbine T-155-6, S-281

mercury used in some types S-284

steamship engines S-124, T-156, S-281, *picture* T-155

water turbine W-51-2, *pictures* W-51, 52

Turbo-electric drive, on battleships N-55

Turbot, a large flatfish F-75

Turridae, the thrush family T-88

Turenne (*tú-rén'*), Henri de la Tour d'Auvergne, Vicomte de (1611-75), marshal of France, one of great captains of history, whose campaigns Napoleon advised soldiers to 'read and re-read'; commanded French armies in many of wars of Louis XIV; *picture* E-295

Turgenev (*tp-rán'yé*'), Ivan (1818-83), Russian novelist T-156-7

Turgot (*túr-jót'*), Anne Robert Jacques, Baron de Laune (1727-81), French statesman and economist, comptroller-general of France under Louis XVI (1774-76); attempted to establish complete freedom of trade and abolish feudal privilege

economy measures L-202, F-201

Marie Antoinette and M-64

Turla (*tp-ré-á*), a river in Spain. See in Index Guadalquivir

Turin (*túr'in* or *tú-rín'*), Italian Torino (*tá-ré-nó*), important city in Italy; pop. 600,000; center of Italian automobile industry: T-157, map I-156

view from the Superga I-163-4

Turina (*tp-ré-ná*), Joaquín (born 1862), Spanish composer, born Seville; pupil of D'Indy ('Procesion del Rocío', for orchestra; 'Jardín de oriente', a dramatic work).

Turken, hybrid of turkey cock and domestic hen.

Turkestan, or Turkistan, region in Asia between the Caspian Sea on the west and Desert of Gobi on the east: T-157-8, A-328, maps A-332a, b

Afghan T-158

oamels C-39

Chinese T-157-8

Mongols conquer M-223

rugs R-173

Russian or Western Turkestan T-158; people, *picture* A-327

Tatars T-16

tea drinking T-27

Turkestan-Siberian Ry. T-158, S-138

Turkey, a country of Asia Minor and Europe; 300,000 sq. mi.; pop. 16,400,000; capital Ankara (Angora): T-159-65, maps E-326c, e, f, A-332a, b

agriculture T-159-60

Bosporus B-198

cities T-161. See also in Index

names of cities

climate T-159-60

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Dardanelles D-15

earthquake B-137

education T-161

European possessions after first

World War B-21

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under Kemal T-160-1

history. See Turkey, history of

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national song N-27

natural features T-159

people T-160; original race T-159

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religion T-161. See also in Index

Mohammedanism

rug making R-172-3

shelter, *picture* T-159, 183, 184; mud

village, *picture* A-326

succession to throne T-163

transportation T-160

Turkish Armenia A-303

women T-161, *picture* T-160, 161

writing: Arabic script A-134b, T-160

Turkey, history of T-159, 162-5, *chart* H-303, *Outline* A-335

rise of power T-162; Hunyady resists

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A-107

Byzantine Empire overthrown B-290

Constantinople I-152

printing introduced P-347

conquests extended T-159, 162;

Baghdad B-14; Crete C-394; Egypt

E-199; Rhodes R-99; Syria S-362

decline of power T-159, 163-4

Greece gains freedom G-162

Serbian revolts S-81

Crimean War C-398

Rumania independent B-257

Russo-Turkish War T-163-4; Bosnia

and Herzegovina B-198; Bulgaria

B-270

Armenian massacres A-303

Young Turk Revolution T-164, 161,

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Italy gains Tripoli L-121b, A-42

Balkan Wars B-19-20. See also in

Index Balkan Wars

1st World War

joins Central Powers W-155

military events W-157, 160, 164

Palestine lost P-33

Dardanelles D-15

gains from Treaty of Brest-Litovsk

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Treaty of Sèvres T-164, T-161,

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Lawrence and Arabs outwit Turks

L-75

war with Greece G-162-3

Treaty of Lausanne T-164, S-167,

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Republic proclaimed, and constitu-

tion adopted T-164-5

modernization under Kemal T-161,

picture T-163

Treaty of Montreux, rearms Dar-

danelles D-15

Ismet Inönü becomes president T-165

2d World War T-165; in Allied con-

ference W-179g

Turkey, a fowl T-158

Australian brush turkey B-192

wild T-158, B-145a

Turkey vulture, sometimes called

turkey buzzard V-336, B-288, color

plates B-130, 135

Turkey wheat W-82

Turki (*tp-ré*'), language spoken in

North Afghanistan A-29

Turkish delight, a confection C-72

Turkish knot, in rug weaving R-172

Turkish rugs R-172-3

Turkish towels T-69. See also in In-

dex Terry cloth

Turkistan. See in Index Turkestan

Turkmenistan, or Turkmen Soviet

Socialist Republic, in Asiatic Russia,

e. of Caspian Sea; area 171,428

sq. mi.; pop. 1,255,000; formed

1924 from w. part of Russian

Turkestan with parts of Bokhara

and Khiva; cap. Ashkhabad (Pol-

taratsk); T-158

women, *picture* R-192

Turkoman Republic. See in Index

Turkmenistan

Turk'omans, Turcomans, or Turkmen,

a branch of the Turkish race in

Turkmenistan, Afghanistan, and

Persia; chiefly nomads

women, *picture* R-192

Turks T-160, 159

racial affinity, *diagram* R-9b

Russia and Siberia T-16

Turks and Calcos (*kí-kós*) Islands, in

British West Indies; form the two

s. e. groups of the Bahamas; area

165 sq. mi.; pop. about 6000; de-

pendency of Jamaica; cap. Grand

Turk; salt, sponges, lobster.

Turk's cap cactus, a barrel-shaped

cactus (*Melocactus communis*)

grooved like a melon or pumpkin;

called Turk's cap because of fez-

like crown; *picture* P-235

Turk's cap lily, *picture* L-137

Turk's cap shell S-108, *picture* S-109

Turku (*túr-ky*'), Swedish Abo, Fin-

land, Baltic port opposite Åland

Islands; pop. 70,000; oldest city and

former capital; shipbuilding, manu-

facturing; exports timber, dairy

products; Swedish University

(founded 1919).

Turmeric, a plant related to ginger

G-88, S-249, 250

"Turn and bank" indicator, on air-

planes G-191

Turner, Charles Yardley (1850-1918),

American landscape and figure

painter, born Baltimore; well

known for mural paintings, es-

pecially those in court houses at

Youngstown, Ohio, and Baltimore,

Md.

mural by, *picture* R-86

Turner, George (1850-1932), Ameri-

can lawyer and statesman, born

Edina, Mo.; associate justice Wash-

ington Supreme Court; U. S. sen-

ator from Washington

Alaska boundary commission R-150

Turner, Joseph Mallord William

(1775-1851), English landscape

painter T-165

'The Fighting Temeraire', analyzed

F-40-1, *picture* F-40

'Grand Canal, Venice', *picture* P-20

landscape engraving B-296

water-colors P-22

Turner, Nat (1800-31), Negro slave,

preacher, born Southampton

County, Va.; led insurrection

against slave owners in August

1831, when 55 whites were killed.

Nat. was hanged; stricter slave

codes enacted.

Turnfest (*tp-ré-fest*'), German word

meaning gymnastic festival, *picture*

G-75

Turnip, vegetable with edible root; re-

lated to cabbage G-2, 3

when and how to plant G-13

Turnpike, or toll road R-112, 116, T-124

Turnstone, a shore bird (*Arenaria interpres*) allied to plover, found in all parts of world; breeds in Arctic, migrates south; pied black and white.

Turnveroin (*turn'fēr-in*), German physical education society founded by Friedrich Ludwig Jahn, early 19th century; spread to U.S.; also furthers intellectual development.

Tur'pontine, pine sap or oil distilled from it T-165-6

palmit and varnish P-32a, b, T-188

synthetic camphor made from C-41

Turpin, Dlek (1706-39), notorious highwayman, born Hempstead, Essex, England; legends of his courages and generosity are without foundation; executed as horse thief and murderer.

Turquino (*tqr-kē'nō*) Peak, highest mountain in Cuba C-410

Turquoise (*tūr-kōis'* or *tūr'kwōis*), a precious stone G-29

December birth stone G-25

New Mexico N-98

Turquoise, fossil, or bone turquoise. See in Index Odontolite

Turret, of battleship N-53, 54, pictures N-50, 54, 55

Turtle, or tortoise T-166-8, T-116, pictures N-29d, T-166, 187

foot, picture F-147

intelligence A-203

length of life, average, pictograph A-198

pets P-156

reptile class, members of R-78

shell T-116, T-167, H-338

snapping, picture N-29d

Turtle dove, European dove of genus *Streptopelia*; ringed turtle dove, *Streptopelia risoria*, introduced in North America. Mourning dove sometimes called by this name.

Turtle-head. See in Index Chelone

Turtle Mountains, range in North Dakota N-161, map N-162

Tusayan (*tp-sē-yū'n*), Hopi pueblos of Arizona, often so called.

Tuscaloosa, Indian chief A-98f

Tuscaloosa, Ala., industrial city 50 mi. s.w. of Birmingham on Black Warrior River; pop. 27,498; cotton, corn, lumber, coal, iron, and live stock; state insane asylum; was state capital 1826-46; map A-98

library, state university, picture A-98c

Tuscan dialect, Italy I-153, I-160

Tuscan Sea. See Tyrrhenian Sea

Tuscany, or Toscana (*tōs-kā'nā*), district in w. Italy, in valley of Arno corresponding roughly to ancient Etruria; fertile, rich in minerals; chief city Florence; chief port Leghorn: I-161. See also in Index Florence

ancient Etruscans E-313-14

history F-108

kingdom of Victor Emmanuel V-294

language and literature I-153, I-160

straw hat making in Signa C-273

volcanic steam power V-334

Tuscarora, the Sixth Nation of the Iroquois; originally occupying Neuse River region of e. North Carolina: I-54

attack North Carolina settlements N-159

Tusculum, ancient city of Latium 15 mi. s.e. of Rome, near modern Frascati; favorite residence of Cicero and other noted Romans.

"Tusitula," name given R. L. Stevenson, picture S-288

Tusk, an elongated tooth

elephant E-246, 248, I-175-6, pictures

E-244, 245, I-175

ivory from I-175-8

peccary and wart hog, pictures H-316

walrus W-8

wild boar B-180

Tuskegee (*tūs-kē'gē*), Ala., center of cotton region, 40 mi. e. of Montgomery; pop. 3937; Tuskegee Institute: map A-98

Tuskegee Institute, Negro school founded 1881 at Tuskegee, Ala.; training in trades, professions: A-98c

Booker T. Washington opens W-12

Tussock moth, a leaf-eating type B-286

antenna, picture B-285

parasitic foes P-70

Tussur silk S-147, C-221a

Tutenkhamon (*tpt-ēnk-āmōn*), king of Egypt about 1850 B.C.

jewelry, picture G-26

tomb A-249-51, E-209, picture A-250: treasures, pictures E-199, 200

Tutill, Richard Stanley (1841-1920), American judge

first children's court J-232

Tuttlingen (*tūt'ling-in*), Germany, town in s. Württemberg; pop. 16,000; victory of Austrians and Bavarians over French 1643 (Thirty Years' War).

Tutuila (*tp-tē-ē'lā*), largest island of American Samoa; 52 sq. mi.; pop. 10,164; exports copra; harbor at Pago Pago: S-20, map P-10c

Tuxpan (*tgs'pān*), Mexico, maritims town on Gulf of Mexico 145 mi. n. of Vera Cruz, map M-133

Tuzigoot National Monument, in Arizona N-22d

TVA (Tennessee Valley Authority) T-49

Tver (*tvēr*). See in Index Kalinin

Twaachtmann (*twōkht'mān*), John Henry (1853-1902), American landscape painter of Impressionist school; born Cincinnati, Ohio; excellent draftsman; works show luminosity and subtle atmospheric effects; called a "minor poet of the brush."

Twain, Mark, pen name of Samuel Langhorne Clemens (1835-1910), American humorist, novelist T-168-9, A-180

compared with Rousseau L-158

origin of name T-188

Twalte shad S-94

Tweed, William Marcy (1823-78), American politician, leader of famous Tweed Ring: N-134

Tweed, river rising in Peeblesshire, s. Scotland, and flowing e. 97 mi. to Berwick; gives name to cloth.

Tweed, rough cloth made of heavy and wiry dyed wool yarns: color plate T-63a-b

Tweedsmuir, Lord. See in Index Buchan, John

Tweezers, a tool T-110

Twelfth Day. See in Index Epiphany

Twelfth Night, end of Christmas celebration N-113, C-229a, picture C-228

"Twelfth Night; or, What You Will", a comedy by Shakespeare, dealing with complications which arise when the shipwrecked Viola disguises herself as a boy, becomes the page of Duke Orsino, and is commissioned to win the Countess Olivia for him; sub-plot concerns practical joke played on Malvolio, Olivia's steward, by Sir Toby Belch, Sir Andrew Aguecheek, and Maria; play said to have been written for Twelfth Night festivities

chronology and rank S-100c

Twelve Apostles A-229, J-214

Twelve labors of Hercules H-282

Twelve Tables, Law of the, first written Roman law (451-450 B.C.) based on old custom; engraved on brass or wooden tablets, placed in Forum.

Twenty-four hour clock T-95

"Twenty Thousand Leagues Under the Sea", novel by Jules Verne (1870); highly imaginative and at time of its writing seemingly impossible, but convincingly told, story of adventures in a sea-going vessel similar to the modern submarine.

"Twenty Years After", novel by Dumas D-119-20

Twick'enhamp, England, residential town on Thames s.w. of London; pop. 40,000; residence of Alexander Pope, Horace Walpole, Louisa Philippe.

Twilight T-169-70

Twilight of the Gods, or Ragnarök, in Norse mythology a time when the world of the gods was to be destroyed. A new world of good was to arise from the destruction. Wagner's opera "Götterdämmerung" was based upon the myth.

Twilight sleep, semi-conscious condition produced by scopolamin and morphine A-196

Twill, a fabric in which the weft is carried over one and under two or more warp threads creating diagonal pattern: picture T-89, color plate T-63a-b

Twiss, Wouter (or Walter) van (1580?-1650?), governor of New Netherland 1683-87; amassed a personal fortune but was much criticized for incompetence in administration; despite his protests English colonists settled in Connecticut valley.

Twinn-berry. See in Index Partridge-berry

Twinn Cities, term popularly applied to St. Paul and Minneapolis, Minn.

Twine R-153-5. See also in Index Rope and twine

Twinn Falls, Idaho, agricultural center 110 mi. s.s. of Boise; pop. 11,861; near Snake River; power from Shoshone Falls; flour mills, creameries; map I-8

Twinn-flower. See in Index Linnaea

Twins, or Gemini, a constellation Z-218, C-95, charts S-275, 276c, f, h

Twinspur. See in Index Diascia

Two-cycle gas engines G-20, 22

"Two Gentlemen of Verona", comedy by Shakespeare concerning two friends, Valentine, who loves Silvia, and Proteus, sweetheart of Julia, who pursues Silvia to forest, where all four meet and make up chronology and rank S-100c

Two Kettle Sioux, a division of the Teton Sioux Indians in S. Dakota.

Two-ocean navy, United States N-51, 56f

Two-phase alternator, an electric alternating-current generator E-218

Two Rivers, Wis., city on Lake Michigan 80 mi. n. of Milwaukee; pop. 10,302; aluminum, marine engines, lumber, furniture, truck farming, dairying, fruit growing, fishing.

Two Sicilies, kingdom formed by union of Sicily and Naples (1130) and at times other parts of s. Italy: N-5

Garibaldi G-15

"Two Years Before the Mast", classic sea story by Richard Henry Dana, Jr. (1840) describing his voyage as a common seaman from Boston, around Cape Horn, to California.

Ty'burn, chief place of execution in London prior to 1783; near n.e. corner of Hyde Park; named from small tributary of Thames.

Tyche (*t'kē*), or Fortuna, in mythology, goddess of fortune F-161

Tycho Brahe. *See in Index* Brahe

Tydings-McDuffie Independence Act P-170, C-239

Tygh (*t'g*), a Shahaptian tribe of Indians in Oregon.

Tyler, John, father of President Tyler T-170

Tyler, John (1790-1862), 10th president of U.S. T-170-1
administration (1841-45) T-170-1:
Dorr's Rebellion R-97-8; first
telegraph line T-30, M-262;
Texas admission authorized T-171;
Webster-Ashburton Treaty T-171,
M-40, S-161

vice-president H-232, T-170
Virginia peace conference C-251
wives and children W-90-1

Tyler, Julia Gardiner (1820-89), 2d wife of President Tyler W-91

Tyler, Letitia Christian (1790-1842), first wife of President Tyler W-90-1

Tyler, Moses Colt (1835-1900), American literary historian, educator; born Griswold, Conn.; professor at Cornell and University of Michigan; broad scholarship ('History of American Literature During the Colonial Time').

Tyler, Wat (died 1881), leader of Peasants' Revolt in England T-171-2, R-104

Wyckliff and the revolt W-191

Tyler, Tex., city 95 mi. s.e. of Dallas; pop. 28,279; ships cotton, corn, berries, rose bushes, vegetables; brick, crates and baskets, clothing, fertilizer, cottonseed-oil.

Tylor, Sir Edward Burnett (1832-1917), English anthropologist noted for Mexican research ('Primitive Culture'; 'Natural History of Religion').

Tyl'tyl, in Maeterlinck's 'Blue Bird' M-24

Tym'pani, or kettle-drums D-114, picture M-322

Tympan'um, or tympan'ic membrane, the ear drum E-126, diagram E-127

Tynan, Katharine (Mrs. H. A. Hinkson) (1861-1931), Irish author; educated in convent; wrote many novels and some children's stories, but is best known for charming poetry on Irish subjects ('Sham-rocks'; 'The Holy War').

Tyn'dale, William (1492?-1536), Eng-

lish translator of New Testament and part of Old; burned as heretic; "more than any other man" gave "its characteristic shape to the English Bible": B-103

Tyndall, John (1820-93), English physicist T-172

Tyne (*t'nn*), river of n. England, rising in Northumberland Hills, flowing e. through coal-mining and manufacturing region into North Sea: map E-270a

at Newcastle N-81

Tynemouth (*t'nn'mūth*), England, seaport and watering place in Northumberland at mouth of River Tyne; pop. 65,000; export trade in coal and coke; fisheries, shipyards; ruins of priory built in 7th century: map E-270a

Tynwald (*t'nn'wōld*) Court, Isle of Man parliament M-49

Tyosen. *See in Index* Korea

Type, printing T-172-4, P-346, 347-8, diagram T-172. *See also in Index*

Printing; Typography

famous designers T-174

font of T-173

linotype L-149-53

measuring, methods T-172-3

monotype M-237-9

origin of letter forms B-176-8

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sources of styles B-177, pictures

B-179, 180

Type-casting machines T-173

Type metal A-132

antimony in A-222

Typesetting

by hand T-173

intertype machine L-153

linotype L-149-53

monotype M-237-9

Typewriter and typewriting T-175

blind, for B-157

early type, picture I-114

electrically operated T-175

ink C-95, I-80

learning, charting progress L-79-80

ribbon, composition G-24

teletype T-32, picture T-33

touch system: learning, picture

V-322; origin B-157

Typhoid (*t'fōid*) fever, a bacterial

disease G-78

bacilli, picture G-78

carried by flies F-128, 129

vaccine A-223-4, picture V-287

Typhoon (*t'fōn'*), Asiatic name for

cyclone S-298

Japan J-186d

Philippines P-165

Ty'phus, or spotted fever G-80

Typography T-172-4. *See also in In-*

dex Books and bookmaking; Printing; Type

famous designers T-173-4
masterpieces of, pictures B-179, 180, 181

printer's cases T-173

title-pages introduced B-181

type T-172-4

Tyr (*t'ir*), Teutonic god of war; gave name to Tuesday.

Tyrannidae, flycatcher family of birds F-129

Tyrannosaur, a huge prehistoric reptile A-206

Tyr'anny, form of government in Greek city-states G-157

modern dictatorships resemble D-67c

Tyre (*t'ir*), famous city of ancient Phoenicia on Mediterranean coast; modern Sur: P-174, map B-8

Tyree Island, Hebrides H-267

Tyr'ian purple, dye obtained from shellfish D-121, P-174

shellfish, picture S-107

Tyrol (*t'ir'ōl*), also Tirol, district straddling German-Italian frontier; famous for scenery; 10,250 sq. mi.; chief city, Innsbruck: T-175-8, A-380, map A-381, pictures A-379, 380

Tyrone (*t'ir'ōn'*), inland county in province of Ulster, Northern Ireland; 1260 sq. mi.; pop. 130,000.

Tyr'rell, James Williams (born 1868), Canadian civil engineer; participated in exploration and surveying expeditions to Hudson Bay and Canadian northwest; published books of travels ('Across the Sub-Arctic of Canada').

Tyrrhenian (*t'ir-rē'nī-ān*), or Tuscan, Sea, between west coast of Italy, and the islands of Sardinia and Corsica: map I-156

Tyrrhenians E-313. *See also in Index* Etruscans

Tyrtæus (*t'ir-tē'ūs*) (7th century B.C.), Greek martial poet; legend says, a lame schoolmaster derisively sent by Athenians to Sparta in response to request for a general in 2d Messenian War; his warlike songs inspired them to victory.

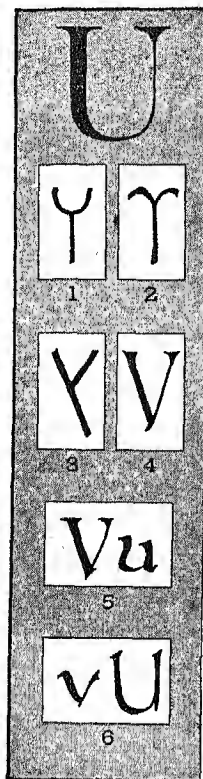
Tytonidae, the barn owl family.

Tyumen (*tū-mēn'*), U.S.S.R., commercial center in Siberia, 120 mi. s.w. of Tobolsk on Tura River; pop. 75,000; tanneries, smelting works, match factories: map A-332b

Tze-Hsi. *See in Index* Tsze-Hsi

Tziganes (*tsig'ā-nēz*), gypsies of Hungary H-360

Tzu-Hsi. *See in Index* Tsze-Hsi



ONLY A FEW LETTERS have been through as many changes as our letter U. This happened because the letter U is closely related in pronunciation to the letters F, V, W, and Y. The resemblance between U and Y appears in our words 'unit' and 'you', and the resemblance between U and W is seen in 'suite' and 'sweet'. The relation between U, F, and V is apparent in the similarity of lip movement when pronouncing 'we', 'fee', and 'vee'. Hence different peoples might use the same sign to mean one or another of these related sounds.

As nearly as anyone can tell, however, the parent sign for all these letters was first used for the sound of 'v' or 'w', as told in the Fact-Index article on the letter V. The early Semitic letter appears in the Canaanite-Phoenician alphabet (1). Most Semitic languages gave it names similar to the Hebrew names *vav* and *waw*.

When the Greeks learned how to write from the Phoenicians, the eastern or Ionic Greeks did not use the sounds of 'v' or 'w' in their speech; but they did have a vowel sound much like that of 'w' in 'we'. We can imitate it by rounding the lips, as though to say 'oh', and then saying 'e-e-e'. They used the *vav* sign to indicate this sound. They gave the letter a graceful shape (2), and they called it *upsilon*.

Meanwhile certain Chalcidian Greeks who settled in Italy passed on a variation (3) of the Semitic *vav* sign and the 'w' pronunciation to the early Romans. The Romans simplified the sign (4), and for a time they used it for all three letters, U, V, and W. For example, they wrote 'Julius' as IVLIVS. We still use this style of 'u' for carving inscriptions on buildings and some monuments.

In late Roman times, Latin writers made the capital letter as V, but rounded the small letter (5). In the later Middle Ages, writers noticed that in the speech of the day, the 'vee' sound came commonly at the beginning of words, and the 'oo' or 'yew' sound within the word or at the end. Therefore they chose the pointed form for 'vee' and the rounded one for 'u'. To make the change complete, they added small 'v' and capital U (6) to their writing.

NOTE.—For the story of how alphabetic writing began and developed, see the articles Alphabet; Writing.

Ubangi (*q-būn'gē*) River, also Mobungi, chief northern tributary of Congo, formed by junction of Mbomu and Welle; flows s.w. and w. 700 mi. forming boundary between French Equatorial Africa and Belgian Congo: maps C-331, A-42a

Uberti (*q-bēr'tē*), Florentine family F-107

Ubleo, Jorge (born 1878), president of Guatemala since 1931; made reputation as soldier and governor of various provinces; chief of staff and minister of war before election to presidency: G-181d

U-boat, German name (contraction of "unterseeboot") for submarine in 1st World War S-311, picture W-161

Ucayali (*q-kī-yā'lē*) River, Peru, one of main headstreams of Amazon; flows n. 1000 mi. to join Marañon: map S-208b

Uccello (*qī-chē'lō*), Paolo (1397-1475), Italian portrait and fresco painter P-18

Udaipur (*u-dī'pūr*), native state of India in Rajputana Agency; 12,928 sq. mi.; pop. 1,570,000; palace on Lake Pichola, picture I-41

Udall (*yū'dāl*), Nicholas (1804?-56), English schoolmaster, author of earliest extant English comedy, 'Ralph Roister Doister'.

Udine (*q-dē-nā*), cap. of Udine province, n.e. Italy, 83 mi. n.e. of Venice; pop. 67,000; makes silk, velvet; trade in flax and hemp; Italian military base 1915-18; occupied by Austrians 1917: map I-158

Udolpho (*ū-dōl'fō*), a medieval castle

in Anne Radcliffe's romance 'The Mysteries of Udolpho' (1794).

Uea (*q-ā'ē*) Island. See in Index Wallis Islands

Uehi Seebell. See in Index Shebell

Uffizi (*q-fē'tsē*) Palace, Florence, Italy (erected 1560-76) I-169-70 gallery. See in Index Museums, table

Uganda (*q-gūn'dā*) Protectorate, British protectorate in East Africa n. of Victoria Nyanza; 94,000 sq. mi. (including over 13,600 sq. mi. of inland waters); pop. 3,500,000; chief product, cotton; cap., Entebbe: E-138, 139, maps E-139, A-42a

Uganda railway (Kenya and Uganda Railways), from Mombasa to Kisumu (Port Florence) on Lake Victoria; another section runs to Jinja, at source of Nile in Lake Victoria: E-138, maps E-139, A-42a

Uhländ (*q'lānt*), Johann Ludwig (1787-1862), German lyric poet, literary historian, and philologist; ballads in the spirit of old folk-songs ('The Luck of Edenhall'; 'The Minstrel's Curse').

Uinta (*yū-n'tā*) Mts., range of n.e. Utah, map U-284

Uist (*uist* or *ist*), North and South, islands of Hebrides H-267

Uitlanders (*oit'lānd-ērə*), or outlanders, Boer name for foreign residents in South Africa S-201-2, B-167

Ujiji (*q-jē'jē*), formerly Kavele, town in Tanganyika Territory, East Africa; on Lake Tanganyika; pop. 25,000: T-8, maps E-139, A-42a

Stanley finds Livingstones S-271, T-8

Ujjain (*q-jū'n*), India, historic town of Gwalior on Shipra River; pop. 54,000; opium trade; one of 7 sacred cities of Hindus; marks first meridian of longitude in Hindu geography.

Ukits (*ū'kits*), a tribe in Borneo E-196

Ukraine (*ū'krān*), Soviet Socialist Republic in s.w. Russia; also called Little Russia; 213,000 sq. mi.; pop. 35,560,000: U-177, map B-18; cities: Kharkov K-15; Kiev K-16; Odessa O-202. See also in Index names of cities

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Ukulele (*yū-kē-lē'lē*), small guitar-shaped musical instrument; used by Hawaiians; designed by a white man after the Portuguese "taro-patch fiddle," which Hawaiians had used; played by strumming; has four strings.

Ulan Bator Khoto, formerly Urga, capital of Mongolian People's Republic M-222a, map M-222c

Ulan Ude, city in s. cent. Siberia at junction of Uda and Selenga rivers near their mouth in Lake Baikal; capital of the Buriat-Mongol Republic; formerly known as Verkhne Uinsk; pop. 130,000; map A-332b, picture S-138

ū=French u, German ü; gem, jō; thIn, then; ù=French nasal (Jean); zh=French j (z in azure); k=German guttural ch

Ulema (*q-lô'mä*), Mohammedan interpreters of the law
decline in Turkey T-161

Ulexite (*yü'lêks-ît*), mineral yielding borax B-192

Ulfilas (*ül'fi-läs*), 'Little Wolf' (811?-883?), apostle to the Goths G-123
Bible of G-62, B-104

Ulanof, Vladimir Ilyich, real name of Lenin L-94

Ulianovsk (*q-l'yün'ôfsk*), or **Ulyanovsk** (formerly Simbirsk), Russia, town on Volga River 480 mi. s.e. of Moscow; pop. over 100,000; river trade; saw mills, flour mills, distilleries; birthplace of Lenin: map E-326e

Ullao (*yü-yô'ä*), Antonio de (1716-95), Spanish mathematician and traveler; in 1748 identified platinum as an element.

Ulm, fortress city of Württemberg, Germany, and river port on Danube 43 mi. w. of Augsburg; pop. 59,000; beautiful Gothic cathedral; manufactures; Austrians under Mack surrendered to Napoleon (1805).

Ulmaceae (*ül-mä'sê-ê*). See in *Index* Elm family

Ulmus, the elm genus E-256-7

Ulna, the outer bone of the forearm on the side of the little finger S-156, picture S-156

Ulnar nerve, nerve from brachial plexus in neck to various muscles of forearm and fingers.

Ulpian Library, ancient Rome L-103

Ulster, a province in n. Ireland; formerly consisted of 9 counties; 6 of these now form Northern Ireland, while 3 are in Ireland (Eire); name Ulster often used for Northern Ireland. See also Northern Ireland history I-127-8, 129
religion and people I-124

Ultima Thule, name used in ancient times to denote the farthest (Latin *ultimus*), or most northerly known land; phrase now used for something far away or unattainable
Shetland Islands S-116

Ultonian (*ül-tô'nî-än*). Cycle, or Red Branch Cycle, in Irish literature I-132

Ultra-centrifuge C-134

Ultramarine, a permanent blue pigment originally obtained by powdering lapis lazuli; now made artificially; valued as oil and watercolor by artists; used in cloth and paper printing, dyeing, ink making.

Ultramicroscope M-157-8
colloidal particles, revealed by C-308

Ultra-violet rays, or **ultra-violet light** U-177, R-14, 15
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Ulyanovsk, Russia. See **Ulianovsk**

Ulysses (*yü-lis'êz*), Latin name for Odysseus.

'Ulysses', book by James Joyce E-288

Umatilla (*yü-mä-tv'lä*), a Shapshian tribe of Indians in Oregon.

Umayyads. See **Ommiads**

Umballa, India. See **Ambala**

Umbelliferae. See **Parsley family**

Umbel, a soft, earthy mineral pigment; contains iron, manganese oxides; mines in U. S. and Isle of Cyprus; raw umbel is dark brown,

burnt umbel is reddish; used in paints.

Umbilicus, stick used to hold papyrus rolls B-175

Umbra, the inner, total shadow cast during an eclipse, diagram E-144

Umbrella-bird, or **dragonbird**, a South American forest bird (*Cephalopterus ornatus*); size and color of a crow; male has bluish, umbrella-shaped crest and plumed wattle.

Umbrella-plant, an East African sedge (*Cyperus alternifolius*) cultivated as a house plant; closely allied to Egyptian papyrus or paper plant.

Umbrella tent C-45, picture C-43

Umbrella tree, a tree (*Magnolia tripetala*) with large white flowers and dark green leaves, often 2 feet long, crowded into umbrella-like whorls at ends of branches; not evergreen: picture M-35

Umbria, district in central Italy, until 1860 part of Papal States I-161
school of painters P-16: masters P-30

Ume River, Sweden, rises in n. in mountains on the Norway border, flows s.e. more than 200 mi. to the Gulf of Bothnia: map N-173

Umiak (*q'mi-äk*), omiak, or oomiak, Eskimo boat C-76, I-62

Umpire, in games, a person chosen to enforce the rules and in case of controversy to settle disputed points
baseball B-57
football F-151

Unakas, another name for Great Smoky Mountains G-150b

Unalachtigo (*q-nä-lôh'tê-jô*), Indian tribe of the Delaware confederacy formerly living on Delaware River in Delaware, and possibly also in New Jersey.

Unalakpa, one of Aleutian Islands, Alaska, about 75 mi. long; town of Unalaska has pop. of 298; Dutch Harbor on island is a U. S. naval base: maps A-105, N-62

Unami, Indian tribe of the Delaware confederacy living on Pennsylvania side of Delaware River.

Unamuno (*q-nä-mô'nô*), Miguel de (1864-1936), a Spanish scholar and author; rector of Salamanca University after 1900, retired 1934; poems and novels remarkable for philosophical quality ('The Tragic Sense of Life'; 'The Agony of Christianity'; 'El Cristo de Velazquez', poem): S-237, picture S-235

Unau (*yü-nä'* or *q-nôw'*), the two-toed sloth S-164

Unceas (*üng'käs*) (originally Wonkus, or fox) (died about 1888), American Indian chief; in 1835 revolted against Pequots and formed a new tribe, the Mohegans; fought with British against other Indians; name used for hero of Cooper's story 'Last of the Mohicans': C-354

Uncial, in handwriting A-135, B-177

Uncle Remus, old Negro teller of tales collected by Joel C. Harris F-135

'Uncle Sam', nickname for U. S. N-143

'Uncle Tom's Cabin', novel by Harriet Beecher Stowe S-304

Unction, extreme, a sacrament C-232

Undamped waves, in radio R-18

Underglaze decoration, of pottery P-328

Underground railroad, for runaway slaves in U. S. history C-250
Ohio C-214

Undershot waterwheel W-51

Understatement, in rhetoric F-33

'Under the wide and starry sky' S-288

Underwood, Oscar Wilder (1862-1929), American statesman, born

Louisville, Ky., representative and senator from Alabama 1895-1927; chiefly responsible for Underwood-Simmons Tariff Act of 1913; Democratic leader in the Senate 1920-23.

Underwood-Simmons tariff T-14

Undino (*ün'dên*), in Fouqué's romance of that name, water nymph who wins a soul by marrying a mortal.

Undivided profits, in a bank B-40, 41

Undset (*ün'sêt*), Sigrid (born 1882), Norwegian novelist, born Kallundborg, Denmark, daughter of a professor of archeology whose assistant she was until his death, when she was forced to earn her own living as a secretary, writing at night; works show great psychological power, unusual ability to recapture feeling of another age; awarded Nobel prize for literature, 1928; war refugee in U. S. 1940 ('Jenny'; 'Kristin Lavransdatter'; 'The Master of Hestviken'; 'Madame Dorthes').

Undulant fever, a disease with attacks of fever, rheumatic symptoms, weakness, nervousness; caused by Brucella organisms, usually from unpasteurized milk; called also brucellosis and Malta fever

Unearned increment T-18

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Unfair competition, control F-22

Ungava (*ün-gä'vä*), former district of Canada, including all of Labrador peninsula except coastal strip; 355,000 sq. mi.
annexed to Quebec Q-3
outpost of fur trade, picture F-228

Ungava Bay, in n. Quebec, inlet of Hudson Strait, map C-50b-o

Ungulates, or **ungulata**, the group of hoofed animals M-44
even-toed (*Artiodactyla*), list Z-229
odd-toed (*Perissodactyla*), list Z-229

Uniates, Eastern Christians who follow rites of Greek Catholic church but accept supremacy of pope.

Unicellular organisms C-122
animal types (protozoa) P-357, pictograph N-64a; amoeba A-188-9
plant types: algae A-118-20; bacteria B-12-13

Unicorn, fabulous beast, usually having head and body of a horse, hind legs of an antelope, tail of a lion, and a long, sharp, twisted horn in the middle of its forehead.

Unicorn, or **Monoceros**, a constellation, chart S-275

Unicorn-plant, or **Proboscidea**, a genus of annual and perennial plants of the martynia family, native to tropical America. The tender 6-in. seed pods which have long curving beaks, are grown as vegetables and used in pickles; large leaves: flowers funnel-shaped. Common unicorn-plant (*P. jussieu*) has white to violet flowers; also called proboscis-flower and martynia.

'Unicorns, The', painting by Davies, picture P-13

Unification Day, Italy H-323

Unified field theory, of Einstein E-211

Uniformitarianism, modern geologic teaching that existing land forms

were created gradually by processes the same as those still at work; opposed to former view (catastrophism) that mountains were due to sudden violent disturbances; view propounded by Hutton and Lyell: D-16

Uniformity, Act of (1559) in England C-233

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British Life Guard, picture L-184

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postmen in various lands, pictures P-316-18, A-36

Unimak (*q-ni-mak'*) Island, Alaska, largest of the eastern Aleutians; lies immediately w. of Alaskan Peninsula; about 65 mi. long and about 25 mi. wide: map A-105

Union, Acts of. See in Index Act of Union

Union, labor L-44-5. See also in Index Labor movement

Union, trade L-44-5. See also in Index Labor movement

"Union, one and inseparable" S-280

Union City, N. J., town 5 mi. w. of Elizabeth; pop. 56,173; embroideries, silks, lace, velvets and plush, cotton fabrics, soaps and perfumes, electrical appliances.

Union College, at Barbourville, Ky.; founded 1879 by Methodist Episcopal church; arts and sciences.

Union College, at Lincoln, Neb.; founded 1891 by Seventh Day Adventist church; arts and sciences.

Union College, at Schenectady, N. Y.; men, non-sectarian; founded 1795; arts and science, engineering, graduate work; part of Union University, which includes Albany Medical College, Albany Law School, etc.; college fraternity system originated here in 1825: S-38. See also in Index Union University

Union contract, in labor L-44c

Union Islands. See in Index Tokelau

Union Jack, flag of Great Britain G-144, F-95, color plate F-38

Union label L-44c

Union League Consumers' Conference C-355b

Union movement. See in Index Labor movement

Union of South Africa. See in Index South Africa, Union of

Union of Soviet Socialist Republics. See in Index Russia

Union of Utrecht U-266, N-72

Union Pacific Railroad, first trans-continental railroad in U. S. R-37

effect: in Nebraska N-60; in Wyoming W-196

united with Central Pacific, picture U-246

Uniontown, Pa., city 40 mi. s.e. of Pittsburgh in coal and agricultural region; pop. 21,819; coke, radiators, glass, textiles.

Union University, institution comprising Union College (men), founded 1795 at Schenectady, N. Y., and Albany Medical College, Albany Law School, Dudley Observatory, and Albany College of Pharmacy at Albany, N. Y.; with exception of College of Pharmacy (incorporated 1881), all were incorporated as Union University 1873.

DECENNIAL INCREASE IN POPULATION OF CONTINENTAL UNITED STATES

CENSUS	POPULATION	INCREASE	PCT.
1940	131,669,275	8,894,229	7.2
1930	122,775,046	17,064,426	16.1
1920	105,710,620	13,738,354	14.9
1910	91,972,266	15,977,691	21.0
1900	75,994,575	13,046,861	20.7
1890	62,947,714	12,791,931	23.5
1880	50,155,783	10,337,334	26.0
1870	39,818,449	8,375,128	26.6
1860	31,443,321	8,251,445	35.6
1850	23,191,876	6,122,423	35.9
1840	17,069,453	4,203,433	32.7
1830	12,866,020	3,227,567	35.5
1820	9,638,453	2,398,572	33.1
1810	7,239,881	1,931,398	36.4
1800	5,308,483	1,379,269	35.1
1790	3,929,214	.....	.....

Unitarianism, a system of Christian belief that rejects the doctrine of the Trinity, fixed creeds, and all authority in religion; first appeared as organized movement in England in 1773; influential in New England from middle of 18th century; membership in U. S. 60,000.

Unitary government, in contrast with Federal government P-294

United Brethren. See Moravians

United Brethren in Christ, evangelical Christian denomination founded in U. S. under leadership of Philip William Otterbein (1726-1818) of German Reformed Church and Martin Boehm (1725-1812), a Mennonite; membership 393,000.

United Church of Canada, union of Presbyterians, Congregationalists, Methodists of Canada, formed 1925: C-234

United Confederate Veterans, organization formed in New Orleans 1889 comprising Confederate soldiers and sailors; strictly social, literary, historical, and benevolent.

United Empire Loyalists C-59

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Ontario K-227, picture C-61: Kingston K-23; Toronto T-113

United Kingdom of Great Britain and Ireland G-144-6. See also in Index England; Ireland; Scotland; Wales

United Mine Workers of America, labor union of anthracite and bituminous coal-mine workers; organized 1890; membership 800,000; headquarters Washington, D.C.

strikes, 2d World War N-127-13

United Nations, in 2d World War W-178w, w, table W-178w

United Nations Relief and Rehabilitation Administration (UNRRA) W-179h-4

United Press N-109

United Provinces N-72. See also in Index Netherlands

United Provinces of Agra and Oudh (also called United Provinces), a province in n. India; consists of British Indian area (106,248 sq. mi.; pop. 48,410,000) and native states called United Provinces States (5943 sq. mi.; pop. 1,205,000): I-31

United Service Organizations (U.S.O.), founded 1941 to conduct recreation centers for men in Army, Navy, and defense industries throughout the U.S.; compriss Y.M.C.A., Y.W.C.A., Salvation Army, National Catholic Community Service, Jewish Welfare Board, and National Travelers Aid Association.

United Sons of Confederate Veterans. See in Index Confederate Veterans

United States, a republic of North America, 3,022,387 sq. mi.; pop. 131,669,275: U-181-98, maps U-188b-c, N-150a, b-c, (relief) U-200, Outlines U-199, 201-5. See also chief entries below by name

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STATISTICS OF PRESIDENTIAL ELECTIONS

YEAR	CANDIDATE	PARTY	POPULAR VOTE	ELEC- TORAL VOTE	YEAR	CANDIDATE	PARTY	POPULAR VOTE	ELEC- TORAL VOTE
1789	Washington	Federalist	....	60	1802	Cleveland	Democrat	5,556,543	277
1792	Washington	Federalist	....	132		Harrison	Republican	5,175,582	145
1796	Adams, John	Federalist	....	71		Bidwell	Prohibition	255,841	..
	Jefferson	Dem.-Repub.	....	68		Weaver	People's	1,040,886	22
1800	Jefferson	Dem.-Repub.	....	73	1806	McKinley	Republican	7,111,607	271
	Burr	Dem.-Repub.	....	73		Bryan	Democrat	6,509,052	176
	Adams, John	Federalist	....	65		Levering	Prohibition	131,312	..
	Pinckney	Federalist	....	64		Bentley	National	13,968	..
	Jay	Federalist	....	1		Matchett	Socialist-Labor	36,373	..
1804	Jefferson	Dem.-Repub.	....	162		Palmer	Nat'l Dem.	134,645	..
	Pinckney	Federalist	....	14	1900	McKinley	Republican	7,219,525	292
1808	Madison	Dem.-Repub.	....	122		Bryan	Democrat	6,358,737	165
	Clinton, Geo.	Dem.-Repub.	....	6		Woolley	Prohibition	209,157	..
	Pinckney	Federalist	....	47		Barker	People's	50,599	..
1812	Madison	Dem.-Repub.	....	128		Debs	Socialist-Dsm.	94,864	..
	Clinton, DeWitt	Federalist	....	89		Malloney	Socialist-Labor	33,432	..
1816	Monroe	Dem.-Repub.	....	183		Ellis	United Reform	5,698	..
	King	Federalist	....	34	1904	Roosevelt, T.	Republican	7,628,785	336
1820	Monroe	Dem.-Repub.	....	231		Parker	Democrat	5,084,442	140
	Adams, J. Q.	Dem.-Repub.	....	1		Swallow	Prohibition	258,950	..
1824	Adams, J. Q.*	.....	114,023	84		Debs	Socialist	402,895	..
	Jackson	.....	152,901	99		Watson	People's	114,546	..
	Crawford	.....	46,979	41		Corregan	Socialist-Labor	33,490	..
	Clay	.....	47,217	37	1908	Taft	Republican	7,677,788	321
1828	Jackson	Democrat	647,276	178		Bryan	Democrat	6,407,982	162
	Adams	Nat'l Repub.	508,064	83		Chafin	Prohibition	252,511	..
1832	Jackson	Democrat	687,502	219		Debs	Socialist	420,890	..
	Clay	Nat'l Repub. }	530,189	49		Watson	People's	29,146	..
	Wirt	Anti-Mason }	.....	7		Higgen	Independences	83,651	..
	Floyd	Nullification }	.....	11		Gillhaus	Socialist-Labor	14,021	..
1836	Van Buren	Democrat	762,078	170	1912	Wilson	Democrat	6,293,019	435
	Harrison	Whig	.....	73		Roosevelt, T.	Progressive	4,119,507	88
	White	Whig	736,250	26		Taft	Republican	3,484,956	8
	Webster	Whig	.....	14		Debs	Socialist	901,873	..
	Mangum	Anti-Jackson	.....	11		Chafin	Prohibition	207,828	..
1840	Harrison	Whig	1,275,016	234	1916	Wilson	Democrat	9,129,606	277
	Van Buren	Democrat	1,129,102	60		Hughes	Republican	8,538,221	254
	Birney	Liberty	7,059	..		Hanly	Prohibition	220,506	..
1844	Polk	Democrat	1,337,243	170		Benson	Socialist	586,112	..
	Clay	Whig	1,299,062	105		Reimer	Socialist-Labor	13,403	..
	Birney	Liberty	65,608	..		.....	Progressive	41,894	..
1848	Taylor	Whig	1,360,099	163	1920	Harding	Republican	16,152,200	404
	Cass	Democrat	1,220,544	127		Cox, J. M.	Democrat	9,147,353	127
	Van Buren	Free Soil	201,263	..		Debs	Socialist	919,799	..
1852	Pierce	Democrat	1,601,474	254		Christensen	Farmer-Labor	265,411	..
	Scott	Whig	1,386,580	42		Watkins	Prohibition	189,408	..
	Hale	Free Soil	156,149	..		Cox, W. W.	Socialist-Labor	31,175	..
1856	Buchanan	Democrat	1,838,169	174		Macaulay	Single Tax	5,837	..
	Fremont	Republican	1,341,264	114	1924	Coolidge	Republican	15,725,016	832
	Fillmore	American	874,534	8		Davis	Democrat	8,886,503	136
1860	Lincoln	Republican	1,866,452	180		LaFollette	Progressive	4,322,356	13
	Douglas	Democrat	1,376,957	12		Johns	Socialist-Labor	36,428	..
	Breckinridge	Democrat	849,781	72		Foster	Workers	36,386	..
	Bell	Union	588,879	39		Faris	Prohibition	67,520	..
1864	Lincoln	Republican	2,213,665	212		Nations	American	23,967	..
	McClellan	Democrat	1,802,237	21		Wallace	C'wealth Land	1,532	..
1868	Grant	Republican	3,012,883	214	1928	Hoover	Republican	21,392,190	444
	Seymour	Democrat	2,703,249	80		Smith	Democrat	15,016,443	87
1872	Grant	Republican	3,597,132	286		Thomas	Socialist	267,420	..
	Greeley	Democrat	2,834,125	163		Foster	Workers	45,770	..
	O'Connor	Independent Dem.	29,408	..		Raynolds	Socialist-Labor	21,603	..
	Black	Temperance	5,648	..		Varney	Prohibition	20,106	..
1876	Hayes*	Republican	4,033,768	185		Webb	Farmer-Labor	6,390	..
	Tilden	Democrat	4,285,992	184	1932	Roosevelt, F. D.	Democrat	22,821,857	472
	Cooper	Greenback	81,737	..		Hoover	Republican	15,761,841	59
	Smith	Prohibition	9,522	..		Thomas	Socialist	884,781	..
1880	Garfield	Republican	4,454,416	214		Foster	Communist	102,991	..
	Hancock	Democrat	4,444,952	155		Upshaw	Prohibition	81,869	..
	Weaver	Greenback	308,578	..		Harvey	Liberty	53,425	..
	Dow	Prohibition	10,305	..		Reynolds	Socialist-Labor	33,276	..
1884	Cleveland	Democrat	4,874,986	219	1936	Roosevelt, F. D.	Democrat	27,772,309	523
	Blaine	Republican	4,851,981	182		Landon	Republican	16,682,524	8
	Butler	Greenback	173,370	..		Lemke	Union	892,793	..
	St. John	Prohibition	150,369	..		Thomas	Socialist	187,342	..
1888	Harrison*	Republican	5,439,853	233		Browder	Communist	80,096	..
	Cleveland	Democrat	5,540,320	168		Colvin	Prohibition	37,609	..
	Streeter	Union Labor	146,935	..		Aiken	Socialist-Labor	12,793	..
	Fisk	Prohibition	249,508	..	1940	Roosevelt, F. D.	Democrat	27,245,422	440
	Cowdrey	United Labor	2,818	..		Willkie	Republican	22,333,801	82
						Thomas	Socialist	116,796	..
						Babson	Prohibition	58,674	..
						Browder	Communist	49,028	..
						Aiken	Socialist-Labor	14,861	..

*For explanation of these elections, without a majority of the popular vote, see the article President.

†Owing to Greeley's death, these votes were cast for: Hendricks 42; Brown 18; Jenkins 2; Davis 1.

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work: erg P-196, R-16; joule P-196; kilowatt-hour P-191

Unity, in fine arts F-38, 40-1

Univalve, mollusk with a one-piece shell S-107, 108

Universalists, Christian denomination which had its beginning in U. S. about 1770; central doctrine is belief in final triumph of good over evil in universe, and salvation of all mankind; doctrine of Trinity rejected; membership in U. S. about 48,000.

Universal language, or international language E-303

Latin as L-87

Universal military service A-308. See also in *Index* Conscription

Universal Postal Union P-323

monument, picture P-323

Universal time, any designation of time, such as Greenwich time, which is used throughout the world without change for longitude; usually employs 24-hour system from midnight to midnight as fixed at originating point, such as Greenwich.

Universe

mathematical foundations C-265

physical character A-341-50, S-272-8; nebulae N-60-1; relativity E-211-18. See also in *Index* Astronomy; Planets; Solar system; Stars

Universities U-257-60, C-301-2. See also in *Index* individual universities by name; Colleges; subhead education under names of states

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athletics A-355-6; boat races B-163; boxing B-212; coaches U-258; football F-148, 151-2

Cairo, Egypt C-14, picture C-17

coeducation E-181

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colonial A-166, E-181

courses: adaptation to needs and aptitudes U-259; Middle Ages U-280

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development in U. S. E-181, M-86; Elliot's influence E-251

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extension courses and service: Alaska A-104; Chautauqua C-163

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fraternities and sororities U-258, table F-256

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honorary degrees D-35

Japan J-190, T-105

land grant colleges as forerunners E-182

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libraries: Canadian L-106n; United States L-106f

medieval E-171-2, 173; books and bookmaking B-179, 182; Oxford O-258; Paris A-3

Mexico M-142b

oldest in the Americas L-87b

oldest in United States E-181; Harvard C-36

origin of word U-260

professional schools E-183-4

scholarships U-259-60

state E-181, 182, U-258

subjects E-184

University City, Madrid, Spain M-24

University City, Mo., joins St. Louis on w.; pop. 83,023; toys, perfumes, cosmetics, oil well supplies.

University College, Oxford O-260; picture O-281

University of. For names of universities see the latter part of name, as Michigan, University of

University Wits, a group of English university men who flourished 1580-95—John Lyly, Thomas Lodge, George Peele, Robert Greene, Thomas Nash, and Christopher Marlowe; influenced growth of Elizabethan drama; criticized non-university-trained dramatists and poets; S-100, 100b

Unknown Soldier. Following the 1st World War, each of the Allied Powers—United States, Belgium, France, Great Britain, Italy, Portugal—buried one of its unknown dead in a prominent place in the capital, or near it, and made the tomb a shrine in memory of all who had died during the war

American U-225; tomb, picture U-225

British L-188; tomb, picture W-73

French: tomb, picture P-71

Unkpapa (*ungk-pä-pä*), a tribe of the Teton Sioux Indians in North Dakota of which Sitting Bull was the most famous chief.

Unleavened bread B-229

ceremonial use P-85

"Unlikes attract and likes repel." in electricity E-220, 221, 227

Unruh (*yn'rq*), Fritz von (born 1885), German writer; born Coblenz; made strong protest against militarism in 'The Way of Sacrifice', based on his war experiences; also wrote dramas: G-64

Unsaturated compounds H-388, C-176a

Unstable equilibrium. *See in Index* Equilibrium, in physics

Unter den Linden (*un'tēr dān līn'dēn*), street in Berlin B-99-99a, picture B-98

Untermeyer, Jean Starr (born 1886), author, born Zanesville, Ohio; formerly wife of Louis Untermeyer; made debut as singer in Vienna and London 1924; translated Oscar Bie's 'Schubert the Man' ('Growing Pains', 'Steep Ascent', poems).

Untermeyer (*un'tēr-mī-ēr*), Louis (born 1885), American poet, critic, parodist, and story writer, born New York ('Roast Leviathan'; 'Burning Bush'; 'Collected Parodies', verse; 'Moses', novel; 'From Another World', autobiography; edited anthologies of poetry).

Untermeyer, Samuel (1858-1940), American lawyer, born Lynchburg, Va.; counsel in many sensational cases involving exposure of "high finance," and in reorganization committees of large corporations; aided preparation of federal currency and trust legislation; ardent Wilson supporter.

Unterwalden (*un'tēr-vül-dēn*), Swiss canton, divided into Nidwalden (Lower Unterwalden) and Obwalden (Upper Unterwalden); total area 296 sq. ml.; total pop. 35,000; S-351, T-43

Untouchables, in India I-38-7

Unwin, Mary, friend of Cowper C-387

Uryte, a synthetic plastic P-246

Upanishads (*u-pān'i-shāds*), Hindu poems I-41

Upas (*yg'pās*) tree, or antlar tree, a Javanese tree (*Antiaris toxicaria*) of the mulberry family T-136

Up Country, vague term for Canada west of Great Lakes (the Prairie provinces)

fur-trading in F-223, 225-6

Uplike, Daniel Berkeley (1860-1941), American typographer, born Providence, R.I.; established Merrymount Press; leader in revival of classical typography in America; lecturer on printing, Harvard University 1910-17; wrote 'Printing Types—Their History, Form and Use'; T-174

'Up from Slavery', by Booker T. Washington W-12

Upland cotton C-362, picture C-379

Upland plover, a sandpiper (*Bartramia longicauda*), found in open fields and pastures; occurs throughout eastern North America.

Uplands, region in Scotland S-44

Upolu (*q-pō'lu*), 2d largest of Samoan Islands; 430 sq. ml.; in Western Samoa (British); principal town Apia; S-20, map P-10c

Stevenson at, picture S-266

Upper Adige (*ü-dē-gā*), or Alto Adige, Italy T-176

Upper Austria, a province in former Austria, now Ostmark, Germany; 4626 sq. ml.; cap. Linz.

Upper Canada, former name of Ontario O-227, C-59-60

Upper case letters, in printing T-173

Uppercut, in boxing B-206, picture B-209

Upper Egypt E-195-6

Upper Iowa University, at Fayette, Iowa; co-educational, Methodist; established 1867; liberal arts, normal school, music, art, business.

Upper Palatinate. *See in Index* Palatinate

Upper Senegal-Niger. *See in Index* French Sudan

Upper Silesia, a province of Prussia;

3750 sq. ml.; pop. 1,379,000. *See in Index* Silesia

Upper Volta, a former colony in French West Africa; apportioned among Niger, French Sudan, and Ivory Coast in 1933.

Uppsala (*up-sā'lā*), also Upsala, a cathedral city of Sweden, 41 mi. n. of Stockholm on Fyris River; pop. 30,000; S-338, map E-326d

Linné, student and teacher at university L-146-9

Ulfilas' Bible manuscript B-104 university U-260

Upsala College, at East Orange, N.J.; founded 1893 by Lutheran church; arts and sciences.

Upton, Mrs. Harriet Taylor, American suffrage leader W-132

Ur (*ūr*), ancient city of S. Babylonia near Euphrates River; site marked by ruin mounds; excavations have revealed temple-tower or ziggurat, built about 2300 B.C., and royal tombs containing rich treasures; map B-8

ancient footprint in brick, picture M-120

glass beads found G-101 original home of Abraham A-3

sculpture, picture A-250 ziggurat, picture A-3

Ural-Altaic, term broadly used for Finno-Tataric languages and peoples. *See in Index* Finno-Tatars

Ural Mountains, low range in Russia forming part of boundary between Europe and Asia; 1500 mi. long; U-260-1, E-318, maps A-332a, b

Ural River, in s.e. Russia; rises in Ural Mts. and Orenburg; flows w. and s. 1485 mi. into Caspian Sea; map A-332b

Uranian, in Greek mythology, muse of astronomy M-305, picture A-228

Uraninite (*yu-rān'i-tī*), a radioactive mineral M-163

Uranium, a radioactive chemical element, of highest atomic weight C-176a, table C-168

glass colored by G-102

lead a final product R-33, L-76 ores R-34-5, M-183; in Colorado C-311

radioactivity R-32-4

uses C-177

Uranium-235, an artificially produced variation of the element uranium A-362

Uranus, in Greek mythology, the first ruler of the world U-261

Uranus, a planet U-261, P-230, 233, diagrams P-230, 231, table P-231

discovery of A-346-9

Urtatu, ancient name for Armenia A-303

Urbain (*ūr-bān'*), Georges (1872-1938), French chemist, discoverer of lutecium.

Urban I (222-230), pope U-261

Urban II (1042-99), pope U-261

calls First Crusade C-403

Urban III (1185-87), pope.

Urban IV (1261-64), pope.

Urban V (1310-70), pope U-261

Urban VI (1318-89), pope U-261

Urban VII (1521-90), pope U-261

Urban VIII (1568-1644), pope U-261

Urban, Joseph (1872-1933), American architect and stage designer, born Vienna, Austria; forerunner of modernism in stage design in America (stage settings, Royal Theaters, Vienna, and Metropolitan Opera Company, New York City; designed New School for Social Research, New York City; planned color effects for A Century of Progress, Chicago).

Urban'a, Ill., city 120 mi. s.w. of Chicago in rich farming district; pop. 14,064; railroad shops; foundries and machine shops; seat of University of Illinois; map I-13

Urbino (*ur-bō'nō*), town in central Italy; pop. 20,000; cap. of former duchy of Urbino; celebrated center of art and literature in 15th and 16th centuries; birthplace of Raphael, now a museum; beautiful palace

potteries P-331

Urchin, sea, a marine animal S-72.

S-277, pictures S-277, O-200c-d

Urd, in Norse myths, one of the three Fates. *See in Index* Norms

Urdu, or Hindustani, a language of India I-34, P-171, 172

Urea (*ū-rē'ā*), a colorless, crystalline compound, CO(NH₂)₂, also called carbamide; produced in nature chiefly by oxidation of proteins inside animal organisms; found in nearly all body fluids, but mostly in urine. Artificially prepared from carbon dioxide and ammonia and in many other ways. Used in fertilizers and plastics, and in helping growth of new tissue in wounds excreted by kidneys K-16

formed by liver L-165

isomer of ammonium cyanate C-176a

plastics from P-245k, l, 246

synthesis by Wöhler C-176a, 178

Urea resins P-245k, l, 246

U'ren, William Simon (born 1859), American lawyer and reformer; initiated Oregon Plan; I-79

Urey, Harold C. (born 1893), American chemist; Nobel prize for discovery of "heavy hydrogen"; C-169, H-366

Urfu, Turkey. *See in Index* Edessa

Urga, former name of Ulan Bator

Khoto, capital of Mongolian People's Republic M-222a, map M-222c

Uri (*q'rē*), Swiss canton; 415 sq. ml.; pop. 23,000; dairying and stock-raising; mountainous; S-350-1

Uriah (*yu-rī'ā*), captain in King David's armies; by David's orders he was betrayed to his death in battle, so that David could marry his wife, Bathsheba (II Sam. xi).

Uriah Heep, in Dickens' 'David Copperfield' a malignant hypocrite who pretends to be so "very 'umble."

Urial. *See in Index* Sha

Urine, the excretion of the kidneys K-18

Urmia, Persia. *See in Index* Rezaleh

Urmia, Lake, Persia P-131

Urn of Fate, in Italian Christmas C-229c

Ursa Major, or Great Bear. *See in Index* Great Bear

Ursa Minor, or Little Bear. *See in Index* Little Bear

Ursinia (*ūr-sin'i-ā*), a genus of South African annual and perennial plants of the composite family.

Plants strongly scented; leaves finely cut; flowers daisylike, yellow or orange, sometimes with a purplish brown on underside of the ray flowers. Also called jewel of the veldt.

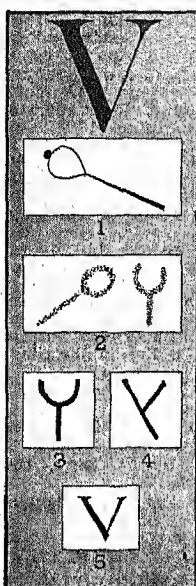
Ursinus College, at Collegeville, Pa.; founded 1869; in affiliation with the Reformed Church in the United States; arts and science.

Ursula, Saint, leader of a group of maidens, who according to legend, proceeded from Britain to Rome and were massacred on their return by Huns somewhere near Lower Rhine (various dates given, 283, 283, 382, 451 A.D.); church erected at Cologne in their honor; festival

October 21
church at Cologne C-304
Ursuline College for Women, at Cleveland, Ohio; Roman Catholic institution for women, founded 1871; arts and sciences.
Ursulines, Roman Catholic religious order founded by St. Angela Merici of Brescia (1470-1540) primarily for education of girls; patron St. Ursula.
Ursus, a genus of bears B-68
Urticaceae (*ür-ti-kä'së-ë*). See in Index Nettle family
Uruguay (*ü-rü-gwä*), smallest of the South American republics; 72,153 sq. mi.; pop. 2,100,000; cap. Montevideo: U-261-3, maps S-2080, d, U-262, Outline S-211
climate U-262
commerce and transportation U-262
flag F-97, color plate F-89
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Montevideo M-248
natural features U-261-2
people and immigration U-262-3
Plata River P-246
products U-262, M-248
woman suffrage W-133
Uruguay River, in South America, rising in s.e. Brazil and flowing 1000 mi. to the Plata River; boundary between Argentina on w. and Brazil and Uruguay on e.: A-280d, maps A-279, U-262
Uruk (*ü-rük*), Sumerian city in Mesopotamia. See in Index Erech
Urumchi (*ü-rüm'chë*), also Tihwa, cap. of Sinkiang province, China, n. of Tien Shan Mts. on caravan route from Peiping; pop. 60,000; wireless station: map A-332b
Urumiyeh, Persia. See in Index Rezaieh
Urus (*ü-rüs*), ancient forebear of certain European wild cattle; now extinct: C-102
Usbegs (*üs'bëgz*). See in Index Uzbeks
"Use" taxes T-17
Usher, James. See in Index Ussher
Uskub (*üs-küp'*), Yugoslavia. See in Index Skoplje
Üsküdar (*üs-kü'där'*), Turkey, also *Scutari*, town opposite Istanbul on e. shore of Bosphorus; pop. over 100,000; barracks of Selim III; hospital used by Florence Nightingale; famous cemetery I-153: maps B-154, E-326e, I-152
U.S.O. See in Index United Service Organizations
Ussher, or Usher, James (1581-1656), English theologian and scholar, author of a biblical chronology printed in margins of Authorized Version; placed creation of world in 4004 B.C.: D-16
U.S.S.R. (Union of Soviet Socialist Republics). See in Index Russia

Ussuri (*ü-sy'ré*) River, in e. Asia, about 450 mi. long; forms part of boundary between Manchukuo and Siberia: map M-49a
Ústí nad Labem (*üs'të näd lá'bëm*), German Aussig (*ous'ik*), Germany, city in Bohemia, on Elbe River, 45 mi. n.w. of Prague; pop. 65,000; coal traffic; chemicals: E-213
Usumacinta (*ü-sq-mä-sën'tä*) River, in s. Mexico and in Guatemala; rises in Guatemala, flows 450 mi. to Gulf of Mexico; navigable a short distance: map M-133
Usury, term originally applied to all lending of money at interest; now applies only to charging of interest in excess of the legal rate: B-44
Utah (*yü'tq*), a w. cent. state of U.S.; 84,916 sq. mi.; pop. 550,810; cap. Salt Lake City: U-263-6, maps U-264, U-188b
agriculture U-264
bird, state B-122
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Great Salt Lake G-150a
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Mormons settle M-258
cricket plague (1850) G-186
Compromise of 1850 C-327-8
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Irrigation U-263-4, 266: U. S. Reclamation Act I-149
minerals: U-263, 264, 266, picture U-265; potassium P-324; radium R-35
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national parks and monuments N-20, 21, 22, 22a, c, d, e, map U-264
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products, chart U-264, list U-263
Utah, University of, state institution at Salt Lake City, Utah; founded 1850 as University of the State of Deseret: arts and science, education, mines and engineering, medicine, law, business.
Utah Lake, largest fresh-water lake in Utah, 30 mi. s.e. of Great Salt Lake; 23 mi. long: map U-264
Utah State Agricultural College, at Logan, Utah; founded 1888; agriculture, arts and sciences, commerce, education, engineering and mechanic arts, forestry, home economics.
Utamaro (*ü-tä'mä-rö*), Kitagawa (1754-1806), Japanese designer of color prints; called "great master of the Popular school": J-202
Ute (*yüt*), group of Indian tribes of Shoshonean stock, occupying mountain region of w. Colorado and e. Utah I-54

Uther (*yü'thër*), King, in Arthurian legends A-315
Utica (*yü'ti-kä*), ancient Phoenician city on n. coast of Africa; sided with Rome in Third Punic War and succeeded Carthage as leading city of Africa; scene of last stand of Pompeians against Caesar and of suicide of younger Cato (46 B.C.).
Utica, N. Y., city 45 mi. e. of Syracuse on Mohawk River and New York State Barge Canal; pop. 100,518. Incorporated as village 1798, and chartered as city in 1832. City is noted for beautiful parks and playgrounds and is gateway to numerous vacation regions. Many musical organizations; Welsh Music Festival annually. Oneida Historical Building has paintings and manuscripts relating to the history of Oneida Co. Munson-Williams-Proctor Institute has interesting art collections. Utica State Hospital for insane (built 1936), State Masonic Home, Soldiers and Sailors Memorial Hospital: map N-114
early history N-120
manufactures N-120
Utilitarians, in philosophy P-172. See also in Index Bentham, Jeremy
Ut-Napishtim (*üt nâ-nish'tim*), the Babylonian Noah B-9
"Utopia", romance by Sir Thomas More M-257-8
Utopian socialism S-180-1
Utrecht (*yü'trëkt*), Netherlands, quaint historic Dutch city on Rhine River; pop. 150,000: U-268, N-69, map B-87
Utrecht, Treaty of (1713) U-266
slave trade clause S-161
Utrecht, Union of U-268, N-72
Utriculus, of ear E-127
Utrillo (*ü-trë-yö'*), Maurice (born 1883), French modernist painter; works distinguished by their extreme simplicity, freshness, and definition of pattern; landscapes and village streets and buildings.
Uvula, a small, fleshy U-shaped mass hanging down from the soft palate above root of tongue P-206
Uxmal (*üs-mäl'*), Mexico, ancient ruined city in n.w. Yucatan, 60 mi. s.w. of Merida; remarkable remains of Maya architecture: Y-211
Maya temple, picture A-148
Uz, home of Job J-220
Uzbekistan, or Uzbek Soviet Socialist Republic, in cent. Asia, formed 1924 from e. part of Russian Turkistan, with parts of Bokhara and Khiva; 142,857 sq. mi.; pop. 6,285,000; cap. Tashkent: T-158
Uzbeks (*üs'bëks*), or Usbegs, a Turkish people, socially and politically rather than racially distinct. They were the dominant race in central Asia from the 18th century until the arrival of the Russians in the 19th century.



OUR LETTER V probably began as an Egyptian picture which meant 'war club' (1). Soon after 2000 B.C., a Semitic people called the Seirites adopted it as an alphabetic sign for the sound of 'w' or 'v'. They did so because to them the club looked like a peg or a nail, and their names *vav* or *waw* for 'peg' began with either one of these sounds. In Semitic speech these sounds were much alike. A resemblance can be seen in English as well, by noticing the movement of the lips in pronouncing 'vee' and 'we'.

The Seirites imitated the Egyptian picture closely (2), and the sign passed without much change into the Canaanite-Phoenician alphabet (3). In Hebrew it was called both *waw* and *vav*; other Semitic peoples gave it similar names.

When the Greeks learned how to write from the Phoenicians, different groups used the letter for various meanings, as explained in the Fact-Index article on the letter U. The Chalcidians, a Greek people who settled in southern Italy, used the 'w' pronunciation, as in 'we', for their form of the sign (4); and the Romans took this pronunciation and sign into Latin. Later the Romans often gave the letter the 'vee' pronunciation, and simplified it (5). They also used the sign to signify the sound of 'u'.

In medieval times, however, the 'w' and 'u' sounds acquired separate signs, as told in the Fact-Index articles on U and W. This left the V sign with the value which it has in English. The small English 'v' is a copy of the capital, except that in handwriting it is connected with adjoining letters.

NOTE.—For the story of how alphabetic writing began and developed, see the articles Alphabet; Writing.

"V," symbol of revolt in German-occupied countries in 2d World War W-178f

Vaal (*vål*) (Dutch "Yellow") River, in South Africa, rises on w. slope of Drakensberg; flows w. 500 mi. to Orange River, of which it is chief tributary: map S-202

Vaasa (*vå'så*), Swedish Vasa, Finland, port on Gulf of Bothnia; pop. 30,000; ships timber; manufactures textiles, sugar, soap, machinery: map E-326a, N-173

Vaca, Alvar Nufiez Cabeza de. See in Index Cabeza de Vaca

Vacation activities V-266a-l autotravel, trailer and bus A-387 effect on school achievement V-266b

Vaccination (*våk-si-nå'shön*) or vaccine therapy, preventing or treating disease with vaccines V-267, A-223-4

live stock, picture C-114

Pasteur's anthrax experiment P-86

Vaccine (*våk'sin*) V-267, A-223-4

Vaccinium, cranberry and blueberry genus of plants C-391

Vacuo-vapor system, heating H-265

Vacuum (*våk'yu-üm*) V-266

airplane lifted by A-67, picture A-75

aneroid barometer B-50

electric lamps E-234, V-266

evaporation increased by E-339, V-266

falling bodies, speed in A-62

measuring V-268

sound cannot traverse, picture S-195

Vacuum appliances P-264-5. See also in Index Pneumatic appliances

Vacuum bottle, or Dewar vacuum flask, picture V-266

Vacuum cleaner V-266, picture E-236

Vacuum filter, picture S-321

Vacuum heating systems H-265

Vacuum ice-making machines R-68, 70

Vacuum pan W-44

sugar-making S-320, picture S-321

Vacuum pump, or air pump P-368, A-64

Vacuum tube (electronic) E-240-3, picture E-241

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alternating current generated by

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vices P-176; telephone relay T-36

audion, invented by De Forest R-27

detecting action R-21-2

filament R-21, diagrams R-22

Fleming valve R-27, picture R-22, E-240

inspection with X-ray X-201

invention R-27

oscillator action R-22

pentode R-23-4, picture R-22

photoelectric cell P-177

radio, R-20-2, 23-4, pictures R-22, 26

rectifying action R-21-2

screen grid R-23, picture R-22

space charge E-245

talking pictures use M-280, pictures

M-279, P-177

telephone relay T-36

television T-41

thyatron E-243

triode, picture R-22

Vaea, Mount, Samoa, burial place of

Stevenson S-288

Vagus (*vå'güs*), or pneumogastric

nerve, mixed nerve descending from

medulla oblongata through the

carotid sheath and branching to

the various internal organs; also

called the tenth cranial nerve.

Vall, Alfred (1807-69), American in-

ventor, born Morristown, N. J.; in

1837 lent money to Samuel R. B.

Morse, and for several years

worked with him in improving the

telephone.

Vall, Theodore Newton (1845-1920),

businessman, born Carroll County,

Ohio; president American Telephone

and Telegraph Co.; did much to

build up telephone industry.

Vallima (*vå-lå'må*), Stevenson's Sa-

moan home S-288

Valsyas (*vå's'yå*), farmer caste

among Hindus I-36, H-293

Valais (*vå-lå'*), canton of s.w. Swit-
zerland, 2020 sq. mi.; pop. 135,000;
magnificent Alpine peaks; tourist
resorts; many minerals, and wines
well known, but most of area is
pastoral. Contains Great St. Bern-
ard and Simplon passes.

Valdai (*vål-då'*) Hills, Russia, groups
of low hills and plateaus midway
between Leningrad and Moscow;
form divide for chief river systems
of country; 800 to 900 ft.: R-179,
map E-318a

Volga River, source V-334

Valdés (*vål-dås'*), Armando Palacio.

See in Index Palacio Valdés

Valdés, Juan de (1500-41), one of
foremost Spanish writers of prose;
dealt with problems of Biblical in-
terpretation and their bearing on
devout life.

Valdez, Pedro de, Spanish naval offi-
cer
surrenders to Drake D-91

Valdez, Alaska, port in s.e. on Prince
William Sound; pop. 529; gold min-
ing, fox farms: map A-105

Valdivia (*vål-då'vå-å*), Chile, manu-
facturing and trade center on Calle-
Calle River 9 mi. from mouth, about
460 mi. s. of Valparaiso; pop.
84,000; iron and steel, freight cars,
tugs and lighters, flour, leather;
distributing center for farm, live
stock, and lumber district; coasting
trade through its seaport Corral:
map C-206

Valdosta, Ga., city in s.-center, in
tobacco- and fruit-growing region;
pop. 15,595; large tobacco trade;
cotton and lumber products; Geo-
rgia State Woman's College: map
G-56

Valence (*vå-låns'*), France, Roman
Valencia, historic town 57 mi. s. of
Lyons on Rhone River; pop. 37,-
000; printed fabrics, flour, tinned
foods; vineyards.

Valence (*vå'léns*), combining capacity
of a chemical element C-170-1,
A-361, table C-168

molecular models, pictures C-170

Key—cåpe, åt, får, låst, whåt, fåll; mæ, yæt, færn, there; åce, båt; råw, wón, fór, nót, dç; cåre, båt, ryde, full, bårn;

Valencia (*vā-lén'shí-á* or *vā-lén'-thē-á*), province of Spain, on e. coast; 4150 sq. mi.; pop. over 1,000,000; agriculture, grazing, fisheries, silk culture; cap. Valencia: S-228, map S-226

Valencia, third largest city of Spain; pop. 320,000; silk; great university: V-268-9, maps S-226, E-326d

Valencia (*vā-lén'sé-á*), Venezuela, city 80 mi. s.w. of Caracas; pop. 50,000; trade in sugar, coffee, cacao, hides; cotton mills: map V-276

Valenciennes (*vā-lén's-yén'*), France, industrial town 28 mi. s.e. of Lille on Scheldt River in coal district; pop. 43,000; famous lace no longer made here.

Valenciennes lace L-48

Valens (328?-378), Byzantine emperor, chosen 364 A.D. by his brother Valentinian I to rule East; warred with Persians and Goths; with his defeat by the Goths at Adrianople (378 A.D.) began the decline of the Roman Empire.

Valentia (*vā-lén'shí-á*) Island, also **Valencia**, off s.w. coast of Ireland; terminus of cables between America and Great Britain.

Valentine, Saint, Christian martyr of 3d century, whose feast day falls on February 14: S-11

Valentine's Day, Saint S-11

Valentinian I (321-375), Roman emperor, son of humble parents, who rose to high rank in army and was elected emperor 364 A.D.; shared power with brother Valens, giving him eastern part of empire; a firm, impartial, tolerant ruler.

Valentinian II (372-392), son of the foregoing, at age of four shared empire of the West with his half-brother, Gratian; driven out with his mother by Magnus Maximus, he was restored by Theodosius, emperor of the East; murdered in Gaul.

Valentinian III (419?-455), Roman emperor, succeeded 425 A.D.; during his reign Africa, Sicily, Gaul, and Britain were lost; murdered Aetius, and was himself murdered the following year.

Valle of Ohlle, or Central Valley C-206, 207a

Valera, Eamon de. See in Index De Valera

Valera (*vā-lā-rā*), Juan (1824-1905), Spanish statesman and politician; marked the renaissance of the modern Spanish novel.

Valerian (Publius Licinius Valerianus), Roman emperor 253-260, elected by army when he was over 60; zealous worker but overwhelmed by constant fighting with barbarians and Persians; defeated by Persians 260 A.D. and held prisoner until his death.

Valerian, perennial herb with opposite leaves and small white or reddish flowers in rounded terminal clusters; thickened and strong-scented root of garden hellebore, or common valerian (*Valeriana officinalis*) and of other species yields a volatile oil used in treating hysteria.

Valerianos (*vā-lā-ré-ū'nōs*), Apostolos. See in Index Fuca, Juan de

Valerian Way, a principal highway of ancient Italy; continued Tiburtina Way (Rome to Tivoli) n.e. to Adriatic.

Valéry (*vā-lā-ré*), Paul (born 1872), French poet and essayist; member of French Academy; writings of unusual beauty and form; a writer's poet, philosophical and difficult

(*'La Jeune Parquise'*; *'Odes'*; *'Fragments du Narcisse'*, poetry; *'Variétés'*, essays): F-198, picture F-198
Valhalla (*vā-lā'lyā*), in Norse mythology, hall of slain warriors in heaven O-202, S-37

Valjean (*vā-lē-jān'*), Jean, hero of Victor Hugo's *'Les Misérables'* H-354

Valkyries (*vā-lē-kr'ēz*), or **Valkyrs**, "choosers of the slain," in Norse mythology, maidens, sent by Odin to conduct souls of slain heroes to Valhalla: O-202, O-232-3

Valladolid (*vā-lā'lyō-lē'd'*), Spain, former cap., 100 mi. n.w. of Madrid; pop. 91,000; Columbus died here; birthplace of Philip II; home of Cervantes; textiles, leather, ironware; university: map S-226

Vallandigham (*vā-lān'dī-gām*), Clement L. (1820-71), American Civil War "copperhead," born New Lisbon, Ohio; Ohio Congressman; convicted of sedition by military court 1863; sentence of imprisonment commuted by Lincoln to banishment to Confederate states; subsequently supreme commander Knights of the Golden Circle.

Vallee, "Rudy" (Hubert Prior Vallee) (born 1901), orchestra conductor, saxophonist, singer, born Island Pond, Vt.; gained fame as first radio "crooner."

Valle-Inclán (*vā'l'yān-ēn-kīl'n'*), Ramon del (1869-1936), Spanish novelist and poet; finely polished prose, also subtle, delicate verse (*'Sonatas'*; *'La Guerra carlista'*; *'Cofre de sándalo'*; *'Tránsito Banderas'*, novels; *'Cara de plata'*, verse).

Vallejo (*vā-lē-jō*), Mariano Guadalupe (1808-90), Spanish-American soldier, California pioneer; built Sonoma garrison on northern frontier; by 1835 had formed alliances with powerful Indian tribes; backed rebellion of 1838 and commanded California troops 1838; after quarrel with governor was captured by Fremont's men (1846); member of constitutional convention (1849) and of first state senate; offered modern Vallejo as site of state capital.

Vallejo (*vā-lā-jō*), Calif., city on arm of San Pablo Bay, 25 mi. n.e. of San Francisco; pop. 20,072; opposite Mars Island Navy Yard; flour-milling.

Valletta, chief town and port of island of Malta; pop. 25,000; large trade; winter resort: M-43, map E-326d

Valley V-269, P-200-1, pictures P-199
canyons C-79; Grand Canyon G-129-31

classification by form V-269

dew D-58

drowned R-110, N-153; New York

N-116; Virginia V-303

flood pathway F-106a-d

mountain-and-valley breeze W-112

Valley City, N. D., city in s.e., 50 mi. w. of Fargo, in agricultural and stock-raising region; pop. 5917; state teachers college: map N-162

Valleyfield, Quebec, industrial city and port on St. Lawrence River at head of Beauharnois Canal, 85 mi. s.w. of Montreal; pop. 11,411; cotton, flour, and paper mills, foundries: map, inset C-50c

Valley Forge, Pa., village on Schuylkill River 20 mi. n.w. of Philadelphia; winter quarters of Washington's army (1777-78): V-269

park V-269

Washington at, picture R-89

Valley of Hinnom, or Gehenna, in Palestine near Jerusalem J-211

Valley of Ten Thousand Smokes, volcanic area in Alaska created by most violent eruption in modern times (Mt. Katmai, 1912); steam, gas jets fill valley; discovered by Robert F. Griggs, 1915-19; part of Katmai National Monument: A-101, N-22a-b, picture N-18

Valley of the Tombs of Kings, Egypt C-18, A-249

Valley of Virginia V-304

Valley Stream, N.Y., residential suburb of New York City on s. shore of Long Island; pop. 16,679.

Vallombrosa (*vā-lōm-brō'sā*), Italy, summer resort in Apennines 20 mi. s.e. of Florence; Vallombrosian order of monks, founded 11th century, now extinct; monastery occupied by Royal School of Forestry.

Valmy (*vā-lī-mē*), France, village 40 mi. s.e. of Reims; scene of decisive battle of French Revolutionists over the Prussians in 1792.

Valois (*vā-lōi'*), Margaret of. See in Index Margaret of Valois

Valois, old district of n.-central France now comprised in departments of Oise and Aisne; countyship in Middle Ages; later united to crown; home of House of Valois.

Valois, House of, French dynasty, branch of Capetian family; reigned 1328-1589. For list, see in Index France, history of, list of rulers
Philip VI first of line P-163

Valona, also **Avlona**, Vlora, port of Albania; occupied by Italy 1916-20; pop. 9000; A-107, map B-18

Valparaiso (*vā-l-pā-rī'sō*), Chile, commercial and manufacturing city, chief American Pacific port s. of Los Angeles; pop. over 250,000 (including suburb, Viña del Mar): V-269, maps C-206, S-208a, picture S-205

Valparaiso (*vā-l-pā-rī'sō* or *vā-l-pā-rā'sō*), Ind., city 40 mi. s.e. of Chicago; pop. 8786; Valparaiso University; varied manufactures: map I-46

Valparaiso University, at Valparaiso, Ind.; Lutheran institution founded 1873; arts and sciences, engineering, law.

Valtellina (*vā-l-tē-lē'nā*), fertile valley of Adda River in n. Italy, fought over by ancient and medieval powers; wines and honey; mineral springs; ruled by Austria 1814-59.

Valtin (*vā-l-tīn'*), Jan, pen name of Richard Julius Herman Krebs (born 1904), writer, born Mainz, Germany; *'Out of the Night'*, autobiography, describes his experiences as a Comintern agent, as a prisoner in a Nazi concentration camp, and as a fugitive after pledging himself to service with the Gestapo.

Value, in color C-308d, chart C-308c

Valve, a device for opening or closing a passage

electric, thermionic, or vacuum. See in Index Vacuum tube

gas engine: automobile A-396, 397,

398; Diesel engine, diagram G-20

heart H-258, photograph H-258a

hydraulic ram H-366, picture H-367

pumps P-366, pictures P-367

safety valve S-282

steam engines S-283; invented S-280

Vampire, in legend B-64

Vampire bats B-64

Van (*vān*), Turkey, town on s.e. shore of Lake Van; important city in Assyrian period; famous cuneiform inscriptions.

Van, Lake, large salt lake in Turkey; 1400 sq. mi.; no outlet

Vanadate, a compound containing vanadium C-175

Vanadium, a chemical element C-175, table C-168 alloyed with steel A-181

Vanbrugh (*văn-brŭ'*), Sir John (1664-1726), English dramatist and architect, one of leading wits of his day; designed Blenheim Palace and many mansions for English nobility comedies D-86

Van Buren, Angelica Singleton (1820?-78), daughter-in-law and White House hostess of President Van Buren W-90

Van Buren, Hannah Hoos (1782-1819), wife of President Van Buren W-90

Van Buren, Martin (1782-1862), 8th president of U.S. V-270-1 administration (1837-41) V-270-1: Aroostook War V-271, M-40; financial panic (1837) V-270, J-179; Goodyear discovers vulcanization R-164; second Seminole War I-68, V-271

early political career V-270 hard cider campaign H-232 wife W-90

Vance, Zebulon Baird (1830-94), statesman of North Carolina, born near Asheville, N. C.; served three times as governor and as U. S. Senator from 1879 until his death defends states' rights N-160

Vancouver (*văn-kə'vēr*), George (1758?-98), English navigator, served under Cook on 2d and 3d voyages; 1791-95 made explorations in Australia, New Zealand, Tahiti, Hawaiian Islands, Vancouver Island, and along n.w. coast of America.

Vancouver, chief city of British Columbia; pop. 246,593: V-271, map C-50b

Vancouver, Wash., port on Columbia River 8 mi. n. of Portland; in timber and agricultural region; pop. 18,788; lumber, aluminum, cannod fruits; stato schools for deaf and blind; Vancouver Barracks; Pearson Field, army post: map W-29 early history O-247-8 oldest apple tree in Northwest, picture A-232

Vancouver, Mount, a high peak in Alaska A-101

Vancouver Island, British Columbia, largest island off w. coast of America; 18,500 sq. mi.: V-271, map C-50b crown colony established C-59 logging train, picture C-54

Vandalia, Ill., city on Kaskaskia River 60 mi. n.e. of St. Louis, Mo.; pop. 5288; state cap. 1820-37: map I-13

Van'dals, Germanic tribe V-271-2 give name to Andalusia S-229 in Morocco M-260

Van de Graaff, Robert Jomison (born 1901), scientist, born Tuscaloosa, Ala.; professor of physics at Massachusetts Institute of Technology after 1934 invents high-voltage generator X-202

Vandergrift, Alexander A. (born 1887), U. S. Marine Corps officer, born Charlottesville, Va.; served in Nicaragua, Mexico, Haiti, China; commander of marines in Solomons 1942-48; made commandant U. S. Marine Corps Nov. 1948.

Vandenberg, Arthur H. (born 1884), American politician, born Grand Rapids, Mich.; U. S. senator after 1928.

Van den Vondel. See in Index Vondel, Joost van den

Van'derbilt, Cornelius (1794-1877), American capitalist and financier, born Staten Island, N.Y., founder

of the Vanderbilt fortune; nicknamed "Commodore" for his early steamboat activities; acquired control of New York Central and other railroads; endowed Vanderbilt University with \$1,000,000.

Vanderbilt, William Henry (1821-85), capitalist, born New Brunswick, N.J.; built up railroad interests left by his father, Cornelius; gave freely to educational causes.

Vanderbilt Mansion Historic Site, luxurious mansion of Frederick W. Vanderbilt (1856-1939), grandson of Cornelius; on Hudson River, near Hyde Park, N. Y.; administered by National Park Service as example of 19th century residence.

Vanderbilt University, at Nashville, Tenn.; founded 1873 by Cornelius Vanderbilt; arts and science, engineering, religion, law, medicine, nursing.

Van der Donck, Adrian. See in Index Donck, Adrian van der

Vandergrift, Pa., borough on Kiskiminetas River 27 mi. n.e. of Pittsburgh; pop. 10,725; farming, dairying, coal mining; sheet iron, tin plate, foundry products.

Vanderlip, Frank Arthur (1864-1937), banker, born Aurora, Ill.; assistant secretary of treasury 1897-1901; chairman War Savings Committee during 1st World War; wrote on financial and economic subjects.

Vanderlyn, John (1776-1852), American historical and portrait painter; an expert draftsman ('George Washington'; 'Marius Among the Ruins of Carthage'; 'Ariadne').

Van der Stucken, Frank V. (1858-1929), American composer and musical director, born Fredericksburg, Tex.; conductor Cincinnati symphony 1895-1907; dean College of Music, Cincinnati 1897-1901.

Vandorvel'de, Emile (born 1866), Belgian Socialist statesman and orator; as foreign minister, influential in negotiations for Versailles Treaty and Locarno Pact.

Van der Weyden (*văn dēr vī'den*), Roger. See in Index Weyden

Van Diemen's (*dē'mēnz*) Land, former name of Tasmania. See in Index Tasmania

Van Dine, S. S. See in Index Wright, Willard Huntington

Van Doren, Carl (born 1885), American literary critic and biographer, born Hope, Ill.; taught English, University of Illinois and Columbia University; former literary editor, *The Nation and Century*; author 'Three Worlds', autobiography; 'Benjamin Franklin', Pulitzer prize biography (1939); with brother Mark Van Doren, 'American and British Literature Since 1890'.

Van Doren, Mark (born 1894), American poet and editor, born Hope, Ill.; editor, 'Anthology of World Poetry', 'American Poets 1630-1930', 'Anthology of English and American Poetry'; lyrical verse: 'Now the Sky and Other Poems'; 'Collected Poems' awarded 1940 Pulitzer prize.

Van Dyck (*văn dīk*), or **Van Dyke**, Sir Anthony (1599-1641), great Flemish portrait painter V-272 'William of Orange and Mary', picture P-19

Van Dyke, Henry (1852-1938), American Presbyterian clergyman and author, born Germantown, Pa.; professor of English literature at Princeton University ('The Blue Flower', short stories; 'Fisherman's

Luck', essays; 'The Builders, and Other Poems')

'Name of France,' quoted F-172

Van Dyke, John C. (1856-1932), American art critic; born New Brunswick, N.J.; professor history of art, Rutgers College since 1889; sound criticism, especially from technical side ('New Guides to Old Masters'; 'Rembrandt and His School').

Vane, Sir Henry (1613-62), English Puritan statesman, friend of religious liberty; governor of Massachusetts 1636-7; returned to England; active Parliamentarian; imprisoned at Restoration and beheaded for treason.

Vane, of feather F-20-1

Vänern, Lake. See **Wener, Lake**

Vanes, blades, or buckets, of a turbine wheel T-156, pictures T-155, 156

Vanes'sa, poetical name given by Swift to Esther Vanhomrigh (1692-1723) in his serious poem, 'Cadmus and Vanessa', Swift being Cadmus.

Vanessa antiopea, or mourning cloak, butterfly, color plate N-38a-b

Van Eyck, Hubert. See in Index Eyck

Van Gogh, Vincent. See in Index Gogh

Van Gordon, Cyrena (born 1898), contralto, born Camden, Ohio; with Chicago Civic Opera Co. 1915-32; then with Metropolitan Opera Co., New York.

Van Hise (*hīs*), Charles Richard (1857-1918), American geologist and educator, born Fulton, Wis.; president University of Wisconsin 1903-18; authority on geology of Lake Superior iron bearing region.

Vanhomrigh, Esther. See **Vanessa**

Van Hoogstraten, Willem (born 1884), Dutch musical conductor; born Utrecht; conducted in Germany, Sweden, Holland; great success as director of New York Philharmonic Society summer concerts.

Van Horne, Sir William Cornelius (1849-1915), Canadian railway executive, born Illinois; after wide experience with U. S. railroads, superintended construction Canadian Pacific Railway, of which he was president 1888-99.

Vanhouttei (*văn-hŭ'tē-i*), a species of spirea S-259

Vanilla, a flavoring substance V-273 beans, picture S-251

coal-tar substitute for C-289

Vanillin, the active ingredient of vanilla V-273

Vanishing race, term applied to American Indian I-66

'Vanity Fair', novel by Thackeray T-72, 73, N-182

Van Loon (*văn lōn*), Hendrik Willem (born 1882), American historian and illustrator, born Rotterdam, Netherlands ('Story of Mankind' for children, awarded Newbery medal 1922; 'R.v.R.', fictionalized biography of Rembrandt; 'The Arts'; 'Van Loon's Geography') 'Story of Mankind' L-158

Van Mook. See **Mook, Hubertus J. van**

Vannes (*văn*), Franco, quaint old town 67 mi. n.w. of Nantes; pop. 24,000; ancient Veniti, taken by Caesar 56 B.C.; rich prehistoric remains; makes fabric, leather, iron.

Vannucel, Pietro. See in Index Porugino

Van Paassen, Pierre (born 1897?), journalist, born Gorcum, Netherlands; went to Canada 1914; joined Canadian forces in France 1917; after 1919 reporter for *The Globe*, Toronto, and columnist for *The Atlanta Constitution*, Atlanta, Ga.; 1924 became foreign correspondent

in Europe for New York *Evening World*; reported Ethiopian war, Spanish Civil war, Zionist movement in Palestine; autobiography 'Days of Our Years'.

Van Rensselaer (*vân-rên's-â-lêr*), Kiliaen (1595-1644), first Dutch patroon of New York, one of founders of New York and Albany. Albany settled A-108 extent of estate N-121 Troy T-145

Van Rensselaer, Martha (1864-1932), American expert in home economics, born Randolph, N. Y.; at Cornell University from 1900—director of extension courses which developed into Home Economics College, of which she was head 1911-32.

Van Rensselaer, Stephen (1764-1839), American political leader and soldier, last of Dutch patroons; ardent promoter of Erie Canal; founded Rensselaer Polytechnic Institute at Troy, N. Y.

Van Rijn (*vân rîn*), Rembrandt Harmenszoon. See in *Index* Rembrandt

Van Stockum, Hilda (born 1908), Dutch-American miniature painter, illustrator and author of children's books; born Rotterdam, Holland; settling of 'A Day on Skates' is Rotterdam; 'Cottage at Bantry Bay' and 'Francine on the Run' are Irish in background.

Van't Hoff (*vânt-hôf*'), Jacobus Hendricus (1852-1911), Dutch chemist and physicist, founder of stereochemistry and first Nobel prize winner (1901) in chemistry.

Van Twiller, Wouter (1580?-1650?), governor of New Netherland, born Nieuwkirk, Holland; clerk for Dutch West India Co. at Amsterdam; made governor 1633; inept government led to trouble with English and Indians, as well as with own people; recalled 1637: N-121

Vanua Levu (*vân-â-lâ'vû*), one of Fiji Islands; 2130 sq. mi.: F-33, maps P-10b, A-372a

Van Vechten, Carl (born 1880), American novelist, born Cedar Rapids, Iowa; assistant music critic *New York Times*, later on *New York Press*; composed 'Five Old English Ditties'; a rebel against dullness and standardization ('Peter Whiffle', 'The Blind Bow-Boy', 'Nigger Heaven', 'Spider Boy').

Vaphio (*vâf-i-ô*) cups, two gold cups found in beehive tombs at Vaphio in Laconia, picture A-28

Vapor, gaseous form of a substance normally solid or liquid W-44, G-18 benzene B-97 light emitted when incandescent S-241

mercury, M-120; electric signs E-238; lamps R-15, Q-3, picture V-268

water W-42, 44; in air E-339, S-282; transportation and condensation W-42a

Vapor cure, of rubber goods R-168

Vapor heating systems H-265

Vaporization, latent heat of W-44

Vapor lamps S-190

Vaporphase, oil refining P-150

Vapor pressure, or vapor tension, in physics E-330, W-44

Vaqueros (*vâ-kâ'rôs*), Mexican cattle herders C-107

Varanger (*vâr-âng'er*) Fiord, on n. coast of Norway, map N-173

Vardar River, in Balkan Peninsula; empties into Aegean Sea near Saloniki, Greece: map B-18

Varennes, Pierre Gaultier de. See in *Index* Vérendrye

Varennes-on-Argonne (*vâ-rên' zân nâr-gôn'*), small town 18 mi. n. w. of Verdun, on Alre River; Louis XVI and royal family captured here when attempting to escape from Paris 1791; taken by Americans on first day of Meuse-Argonne offensive in 1st World War.

Vargas (*vâr'gâsh*), Getulio Dornellas (born 1882), president and dictator of Brazil, born São Borja in the state of Rio Grande do Sul; educated in military schools, and studied law. Entered politics in his native state, becoming governor in 1927. Led a revolt in 1930, and with aid of a group of army and navy officers seized control of the government and made himself president policies as president B-228

Variability, in biology B-118

Variable condenser, in radio R-18 symbol for R-24

Variable pitch propeller, in airplane A-84

Variable star, a star whose brilliancy changes from time to time S-272, 275

Variation, in biology E-342

Variation, magnetic, also called magnetic declination, angle between magnetic and true north C-326, map C-327

Varied hunting, a small bird of the finch family B-273

Variety, in plant and animal classification B-116

'Variorum Shakespeare' S-100g

Varley, John (1778-1842), English landscape painter and art teacher, whose instruction laid foundation of an English school of water-color painting ('Treatise on the Principle of Landscape Design').

Var'na, chief port of Bulgaria, on Black Sea; pop. 70,000; ancient Odessus; cotton mills; exports cattle, grain: map B-164

Varnhagen von Ense (*fûrn'hâ-gên fôn ên'zû*), Rachel (1771-1833), German author remembered for her letters and for her influence on A. von Humboldt, Goethe, Carlyle, and other literary men; her salon in Berlin was the most important in Germany; her husband, Karl (1785-1858), wrote historical and literary sketches of permanent value.

Varnish V-273, P-32b, diagram P-32a. See also Paints and varnishes

Varnish tree L-51

Varro (*vâr'ô*), Marcus Terentius (116-27 B.C.), Roman historian and soldier, "most learned of the Romans"; most of writings lost.

Varuna (*vâr'u-nâ*), in early Hindu religion, creator and ruler of the world; later, god of the waters.

Varus (*vâr'ûs*), Publius Quinctilius, Roman general whose defeat by Arminius in the Teutoburg Forest (9 A.D.) limited Roman empire to the Rhine. Disheartened, Varus killed himself and the Emperor Augustus cried in anguish at the news: "Varus, Varus, give me back my legions!"

Varve, in geology D-113a

Indicates climate changes C-271 time estimated by I-3

Varying hare, or snowshoe rabbit H-222-3

Vasa (*vâ'sâ*), Swedish royal house beginning with Gustavus I, 1523, and ending with Christina, 1654. For list see in *Index* Sweden

Vasa, Finland. See in *Index* Vaasa

Vasari (*vâ-zû'rê*), Giorgio (1511-74), Italian author, painter, and architect (Uffizi Palace, Florence), biographer and "father of modern art, history and criticism" ('Lives of the Most Eminent Painters, Sculptors, and Architects', a classic despite inaccuracies) account of Raphael R-50

Vasco da Gama. See in *Index* Gama, Vasco da

Vas'cular, or circulatory, system. See in *Index* Circulation

Vas'eline, trade name for petrolatum P-149

Vases. See also in *Index* Pottery

Aegean A-26

Chinese, color plate following C-221g famous examples, pictures E-333-6 Greek P-330, G-165, pictures P-332, G-162

Japanese, pictures E-265, J-200

Mexican malolica, picture P-335

painting design, picture P-331

Portland vase, picture E-338

Wedgwood, picture P-335

Vashti (*vâsh'tî*), queen of Ahasuerus, king of Persia, put aside for disobedience (Book of Esther).

Vassal, subject of a feudal lord F-28 conflict with kings F-30

freedom from central authority F-29

Vassar (*vâs'âr*), Matthew (1792-1868), American brewer and philanthropist, born England; gave 200 acres of land and \$788,000 to found Vassar College.

Vassar College, at Poughkeepsie, N. Y.; for women; non-sectarian; founded by Matthew Vassar; incorporated 1861; arts and science; pictures N-119, E-182

Vat Arun, or **Vat Chang**, Bangkok, pictures T-73b, A-275

'Vaterland', former name of the *Leviathan*, a German ocean liner; surrendered to U. S. after 1st World War; scrapped 1937.

Vathek, hero of 'The History of Caliph Vathek', fantastic Oriental romance by William Beckford, written in style of 'Arabian Nights'.

Vatican, palace of the pope at Rome R-142-3, R-145, E-331-2, pictures A-268, P-55. See also in *Index* Sistine Chapel; Vatican City art treasures R-142-3

library L-105, R-143, picture L-106a: humidity control A-385

Vatican City, independent state under temporal rule of pope; area, 109 acres; pop. 1000: P-227, I-168, picture P-55

flag P-97, color plate F-89

Vatican Council, called by Pope Pius IX P-227

Vatican manuscript of Biblio B-104

Vättern, also **Wetter**, 2d largest lake in Sweden; 733 sq. mi.: map N-173 Göta Canal S-337

Vauban (*vô-bân*'), Sébastien le Prestre de (1633-1707), famous French military engineer; had charge of French fortifications and conducted a number of successful sieges; made marshal 1703.

Vaudeville (*vôd'vîl*), theatrical entertainment of French origin composed of songs, sketches, dances, and acrobatics; word originally meant a lively ballad.

Vaudols (*vôd-wô*'). See in *Index* Waldenses

Vaudreuil-Cavagnal (*vô-drâ'yû kâ-vân-yâ'l*'), Pierre François, Marquis of (1698-1765), last French governor-general of Canada, succeeding Duquesne in 1755; his father, Philippe (1641?-1725), was appointed governor-general in 1703.

Vaughan (*vgn*), Henry (1622-95), Welsh poet and mystic, called the "Silurist" because his native region was that of the Silures, an ancient people of Britain; wrote chiefly on love and religion ('The Retreat'; 'The World'; 'Peace'; 'Beyond the Veil').

Vaughan, Herbert, Cardinal (1832-1903), English Roman Catholic prelate, Manning's successor as cardinal and archbishop of Westminster; known for his support of temperance movement and interest in commercial education (founded St. Bede's College, Manchester).

Vaughan, Phineas W., American inventor of barbed-wire machinery W-121

Vaughan-Williams, Ralph (born 1872), English composer; much of his work inspired by folk music; conductor Each Choir ('Toward the Unknown Region'; 'London Symphony'; 'Pastoral Symphony'; 'Sea Symphony'; 'Hugh the Drover', ballad opera).

Vault, in architecture, a development of the arch principle A-249. See also in *Index* Arch; Dome cross-vault A-261, A-263 fan vaulting A-269 Gothic A-269, picture A-268 groined A-261

Romans develop A-261 Romanesque A-263-4 tunnel construction A-249, A-261

Vaulting, pole, picture A-356 **Vauquelin** (*vsh-lsh*'), Nicolas Louis (1768-1829), French chemist, discoverer of chromium and beryllium.

Vauxhall (*vgks-hgl*) Gardens, London, on Thames River, built 1661; fashionable resort; closed 1859 and site built over.

Veblen, Thorstein B. (1857-1929), American economist; taught at several universities and at New School for Social Research, New York; attacked current economic theories especially in regard to capitalism and industry ('The Theory of the Leisure Class'; 'The Instinct of Workmanship'; 'The Vested Interests').

Vechnip (*vsh-ysh*'), Ponte, bridge in Florence, picture I-165

Vecchio Palace, or Palazzo Vecchio (Old Palace), Florence I-169, pictures I-169, 171

Vecellio, Tiziano, Italian name of Titian. See in *Index* Titian

Veicht (*fsht*) River, branch of the Rhine, 18 mi. long; flows into IJssel Lake; U-266, map B-87

Veda (*vd-ds*'), sacred writing of Hindus H-293, I-38, 41, B-218 school curriculum E-167

Vedanta (*vd-dsh-tsh*'), Hindu philosophy founded on Upanishads, parts of Veda; treats soul and universe in relation to Supreme Spirit.

Ved'dahs, or Veddas, a people of Ceylon C-137 clothing C-275 foods F-140

racial affinity, diagram R-9b

Ved'der, Elihu (1836-1923), American painter and illustrator, born New York City ('Cumaeon Sibyl'; 'African Sentinel'; illustrations for Omar Khayyam)

'Good Government', picture G-124

Veery, a thrush T-88

Vega (*vd-psh*'), Garcilaso de la (died 1616), Peruvian historian L-67s

Vega (*vd-psh*'), a fixed star S-274, 275, charts S-275d, e, h

Vega Curpio (*vd-psh ksh-rpsh-s*'), Lope Félix de (1562-1635), generally called Lope de Vega, Spanish dramatist and poet ('The Sword of Madrid'; 'Star of Seville'); S-234

Vegetable fibers T-69. See also *Fibers*

Vegetable Ivory, or tagua nut I-176, N-188

used for buttons B-287-8, N-188

Vegetable marrow, a squash S-265

Vegetable oils F-19 lighting with L-57

nut, or vegetable, margarine from O-221

Vegetables, edible plants or plant parts, *Outlines* A-60, H-328. See also names of vegetables

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food value F-146, chart F-144b, picture F-144a

gardening G-6-8, 11, table G-13

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Vegetarianism, practise of living on vegetable foods, abstaining from fish, flesh, and fowl.

Vegetation, distribution of E-145g, i

Africa, map A-42b

altitude influences, pictograph E-145d

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North America, map N-150a

South America, map S-208d

Vell (*vd-yi*'), Italy, ancient Etruscan stronghold R-130, 132

Velle, Denmark. See in *Index* Vejle

Veiled Prophet of Khorassan, Festival of the, a festival held annually since 1878 at St. Louis, Mo.; modeled after Mardi Gras at New Orleans; "veiled prophet" said to have been inspired by the veiled prophet of Khorassan, a character in Thomas Moore's poem 'Lalla Rookh'; S-10

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Veins, in body B-157a, P-207, pictograph H-258a

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portal L-165

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vena cava, picture H-258

Veins, in plants L-88

flower petals, pictures F-122, 123

Vejle (*vd-ls*'), also Velle, seaport in e. Denmark at head of Vejle fiord; pop. 24,000; dairying, shipbuilding, ironwork, textiles; map D-53

Velamen (*vd-lsh-men*'), of air plants A-95

Velásquez (*vd-lsh-kath*'), Diego (1465?-1522?), Spanish soldier; accompanied Columbus to West Indies on 2d voyage; first governor of Cuba, founded Havana (1519) Cortez and C-372, 373

Velasquez, Diego Rodri'guez de Silva y (1599-1660), Spanish painter V-273-4, P-18

Murillo and M-302, 804

paintings, Prado National Museum, picture M-23

'Surround of Breda', picture P-18

'Vulcan and Apollo', picture M-326

Veld (*vdlt*'), or veldt, plains in South Africa A-36, S-199

Velites (*vd-lsh-tss*'), in ancient Rome lightly armed foot soldiers A-307f

Vel'um, a fine parchment P-57

bookbinding B-182

books B-176, 178

drum heads D-114

ink for use on B-176

Veloc'ipede, early form of bicycle B-107

dandy-horse, picture T-123

Velocity, in physics, rate of motion, or speed, in a given direction. See also in *Index* Speed

Velocity turbines T-156

Velour, or velours (*vd-lpr*'), a drapery fabric with a short, thick pile; made of mercerized cotton, silk, or mohair. The term is also applied to fine woolen fabrics with a soft, velvety nap, used for coats and dresses, and to a velvety felt used for hats.

"Velox," a photographic paper C-289

Velvet, a fabric

introduced into Europe C-406

Italian textiles and design T-64

steaming, picture S-92

weaving T-69

Velvet, of antlers D-35, picture D-37

Velvet ant, a wingless wasp W-35

Velvet bentgrass. See *Bentgrass*

Velveten, a fabric T-69

Velvet leaf. See in *Index* Indian mal-low

Ve'na ca'va (hollow vein), superior and inferior, the two great blood vessels that carry venous blood into the right auricle of the heart, the superior from head, arms, and upper part of trunk, the inferior from abdominal organs and lower part of body; picture H-258

Vendée (*vdsh-dd*'), maritime department of w. France; 2690 sq. mi.; pop. 390,000; center of royalist revolt (1792-93) against French Republic.

Vendet'tas, or feuds, violent quarrels, often hereditary, between clans or families

Albania A-107

Corsica C-372

Kentucky K-13

Vending machine A-385, picture A-384

Vendôme (*vdsh-dsh*'), French town 35 mi. n.e. of Tours; pop. 7000; ruins of 11th-century castle of Counts of Vendôme; birthplace of Rooham-beau; glove making.

Vendôme Column, a war memorial in Paris P-72, 75

Veneer V-274

gumwood used as base G-188

redwood buris S-80

"Venerable Bede, The." See in *Index* Bede

Ven'eti, an ancient tribe of n. Italy; also a powerful maritime people who inhabited w. France around Vannes, conquered by Julius Caesar 56 B.C.

Venetia (*vd-nsh-shi-d*'), district in n. Italy between Alps and Adriatic Sea; ancient Roman province; long ruled by Venice; held by Austria 1797-1866; I-161 Italy gains I-158

Venetian glass G-105, 106

Venetian point lace, picture L-49

Venetian school, of painting masters, list P-30

Venezia (*vd-nsh-shi-d*'), Italy. See in *Index* Venice

Venezuela (*vdn-sh-shi-d*'), United States of a republic of South America on the Caribbean Sea; 852,170 sq. mi.; pop. 3,500,000; cap. Caracas: V-274-7, maps V-276, S-208b, d, *Outlines* S-211

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 shelter, pictures V-275, S-111
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 Venezuela, Gulf of, or Gulf of Maracaibo, inlet of Caribbean Sea in n.w. Venezuela, map V-276
 Venice, Calif., former resort city on Pacific, annexed to Los Angeles 1925; planned after Venice, Italy; formerly called Ocean Park.
 Venice, Italy, also Venezia, city built on 117 small islands in a bay of the Adriatic Sea; pop. 260,000: V-277-9, I-170-2, map I-156
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 Venice, Gulf of, map I-156
 "Venice of the East" (Batavia) J-205, picture J-203
 Venice of the Netherlands, Amsterdam A-189
 Venice of the North, Stockholm S-289, picture S-339
 Venidium (*ve-nid'ŭm*), a genus of annual and perennial S. African plants of the composite family. Leaves lobed, one lobe much larger than others; flowers solitary, daisy-like, in a wide range of soft colors, with each ray floret darkly blotched at base, and center florets dark.
 Venire (*ve-ni're*), legal summons to jury service.
 Venkman, a juror summoned to jury service J-231
 Venizelos (*va-nē-zā'los*), Eleutherios (1864-1938), Greek statesman V-279-80, G-163, W-184
 Ven'om, snake poison S-172
 Venous blood, blood carried by veins B-157a
 Ventilation H-265-8
 air conditioning H-266
 hygiene H-374-5
 mines M-188
 Ventriole, cavity in an organ heart H-258
 Ventriolism, art of throwing voice so that it seems to originate at a distance from the speaker. It is possible ancient priests used trick to work "miracles" such as the Greek oracles.
 Ventspils, Latvia. See Windau
 Ventura, Calif. (officially San Buenaventura), city on Pacific Ocean 63 mi. n.w. of Los Angeles; pop. 13,284; oil and gas; fruits, nuts, and vegetables; San Buenaventura Mission established 1782.
 Venturi meter, for measuring water M-130

Ve'nus, Roman goddess of love and beauty, identified with Greek Aphrodite V-280, A-227
 Psyche and C-413-14
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 'Venus and Adonis', by Shakespeare S-95, 98
 Venusberg, in Tannhäuser legend T-9
 Venus de Milo, statue A-227, G-188, E-328, pictures E-333, A-227
 Venus's flower-basket, a sponge S-260, S-261
 Venn's fly-trap, an insect-eating plant V-280, picture V-280
 Venus's hairstone. See in Index Sag-enite
 Venus shell, or cowry, a genus of mollusks S-108, pictures M-220a, S-109
 Vera Cruz (*ve'r'd kruz*), Mexico, state in e. on Gulf of Mexico; 27,786 sq. mi.; pop. 1,375,000; cap. Córdoba (pop. 19,000); chief port Vera Cruz.
 Vera Cruz, Mexico, port on the Gulf of Mexico, e. of Mexico City; pop. about 70,000: V-280-1, map M-133, picture M-141
 captured by Scott (1847) M-132
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 United States occupies (1914) M-142e
 Verazzano, Giovanni da. See in Index Verrazano
 Verb V-281-2, G-128
 in writing W-189
 Verbena, a genus of annual or perennial herbs of the family *Verbenaceae*, also called vervain. The many varieties of garden verbenas, with their white, red, and purple flower clusters, are descendants of several S. American species when to plant G-7-8
 Verbenaceae (*ver-bē-nā'sē-sē*). See in Index Vervain family
 Verchères (*ver-shēr*), Marie-Madeleine Jarret de (1878-1947), Canadian pioneer heroine; when 14 years old, in absence of parents, defended home fort, about 20 mi. below Montreal, against Iroquois Indians.
 Verdingetorix (*ver-sin-gēt'ō-rīks*) (died 45? B.C.), chief of the Arverni in Gaul, leader of the great rebellion against Caesar; beheaded by Caesar's order: picture C-12
 Verdandi, in Norse myths, one of the Fates. See in Index Norns
 Verd antique. See in Index Serpentine
 Verde (*ver'd*), Cape, westernmost point of Africa A-32, map, inset A-42a
 Verden (*fēr'dēn*), town of Hanover, Prussia, 21 mi. s.e. of Bremen on Aller River; pop. 10,000
 Charlemagne executes Saxons C-148
 Verdi (*ver'dē*), Giuseppe (1818-1901), Italian composer V-282
 'Aida' V-282: story O-229
 'Il Trovatore', story O-234
 'La Traviata', story O-234
 'Otello' O-232, V-282
 'Rigoletto', story O-232
 Verdigris, a green crystallized substance produced by action of acetic acid on copper; used as pigment in paints, in liniment, in dyeing, and calico printing. Name also popularly applied to green rust formed on copper by weathering, chemically a copper carbonate: C-358
 Verdigris River, rises in s.e. Kansas and flows southward into Oklahoma; enters Arkansas River near Ft. Gibson; about 280 mi. long.
 Verdm. See in Index Goldtitt
 Verdun (*ver-dūn*), France, fortified city; pop. 20,000: V-282-3, W-159, maps W-158, 151, pictures F-181, V-283

Verdun, Quebec, residential suburb of Montreal on St. Lawrence River; pop. 60,745: map, inset C-50c
 Verdun treaty (843 A.D.), partition of Charlemagne's empire V-283, G-71
 Vereeniging (*fēr-d'nē-zing*), Peace of (1902), agreement which ended Boer War; signed at Pretoria and also called Treaty of Pretoria.
 Véréndrye (*vā-rān-drē*), Pierre Gaultier de Varennes, Sieur de la. See in Index La Vérendrye
 Verendrye National Monument, N. D. N-22c
 Vereshchagin (*ver-esh-chā'gin*), Vasil (1842-1904), Russian painter; by realistic pictures of horrors of war sought to promote peace ('The Pyramid of Skulls'; 'Left Behind').
 Verga (*ver'gā*), Giovanni (1840-1922), Italian novelist, born Catania, Sicily; sketches of Sicilian peasantry ('Cavalleria Rusticana', basis of Mascagni's opera; 'The House of the Medici Tree').
 Vergennes (*ver-zhēn*), Charles Gravier, Comte de (1717-87), French foreign minister under Louis XVI
 American colonial policy R-88
 Vergil (Publius Vergilius Maro) (70-19 B.C.), Roman poet V-284, L-89, picture R-129
 Dante's 'Divine Comedy' mentions D-12
 famous manuscript B-178
 quotation C-102
 'Story of the Wooden Horse' T-143-4
 Verhaeren (*ver-hār'ān*), Émile (1855-1916), Belgian poet and critic; early poems impressionistic in tone; influenced by Flemish artists; later showed patriotic fervor and interest in social problems; glorified the beauty of Flanders.
 Verkhoyansk (*ver-kō-yānsk*), village in n.e. Siberia on Yana River; one of coldest places in world, where temperature has touched -90° F.; S-136, map A-332b
 Verlaine (*ver-lēn*), Paul (1844-96), French lyric poet, whose verse is the sincere expression of his ever-varying emotions and of his delight in the fine shades of sensation ('Poèmes saturniens'; 'Sagesse', a collection of religious poems; 'Amour'; 'Bonheur'; 'Fêtes galantes'; 'La bonne chanson').
 Vermeer (*ver-mēr*), Jan (1632-75), also known as Jan van der Meer, Dutch genre and landscape painter; for nearly two centuries forgotten, now acclaimed for the brilliant style of his early manner as well as the refined delicacy of later years ('View of Delft'; 'Diana at Her Toilet'; 'Street Scene in Delft'; 'Mary and Martha').
 Vermines, the worm division of the animal kingdom W-180a, b
 place in animal classification A-199
 Vermicelli, a kind of macaroni M-1
 Vermiform appendix. See in Index Appendix, vermiform
 Vermilion, a scarlet pigment used in paint; English vermilion, mercury sulphide, very opaque but not permanent in color; American vermilion, chromate of lead, has good color strength but is blackened by sulphides; because of high price, both the above have been extensively replaced by coal-tar dyes.
 Vermillion Range, Minn. M-192
 Vermillion, S. D., trade center on Missouri River 85 mi. n.w. of Sioux City, Iowa; pop. 3824; state university.
 Vermont, a New England state of the U.S.; 9609 sq. mi., pop. 359,231;

cap. Montpellier: V-284-8, *maps* N-86, U-188c
 agriculture V-286-7; horsee H-344; maple sugar M-57
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 Vermont, University of, at Burlington, Vt.; state control founded 1791; arts and science, agriculture, engineering, medicine: *picture* V-285
 Vernal equinox E-299, S-71, *picture* E-153
 determines date of Easter E-140
 Verne (*věrn*, French *věrn*), Jules (1828-1905), French author; studied law and wrote for theater before becoming novelist; wrote extravagant, semiscientific tales of adventure that delight both children and adults; many inventions imagined by him have since become real, such as the submarine and wireless ('Around the World in Eighty Days'; 'Twenty Thousand Leagues under the Sea').
 Vernier (*věrn'ěr*), instrument invented by Pierre Vernier for increasing the accuracy of reading measurements of lines and angles M-155
 Vernis Martin (*věrn-ně' mār-tān'*) ('Martin varnish'), a brilliant translucent lacquer developed in the 18th century by the Martin brothers; the secret of making it is now lost and many of the articles decorated with it are in museums.
 Vernen, Dorothy (18th century), daughter and heiress of Sir George Vernon; eloped with Sir John Manners and became ancestress of dukes of Rutland; heroine of Charles Major's novel, 'Dorothy Vernon of Haddon Hall'.
 Vernon, Edward (1684-1757), English admiral; captured (1739) Porto Bello, Panama, with a fleet of 6 ships. Mount Vernon was named for him.
 Verona (*vā-rō'nā*), Italy, fortified city 62 mi. w. of Venice on Adige River; pop. 165,000; noted art center in Middle Ages; famous art collections and Roman remains; Congress of great European powers 1822; bombarded by Austrian aviators in 1st World War; scene of 'Romeo and Juliet': *map* I-156
 Veronal, a narcotic drug N-12
 Veronese (*vā-rō-nā'zā*), Paul (1528-88), great painter of Venetian School; real name Paolo Cagliari; all works outstanding for spectacular effects in color, pattern, and composition; magnificent mythological paintings in Doge's Palace, Venice, include 'Rape of Europa'.

Veronica (*vě-rōn'i-kā*), Saint, legendary woman of Jerusalem, on whose kerchief, used by Jesus to wipe the bloody sweat from his brow on way to Golgotha, his portrait was said to have been miraculously imprinted; festival July 12.
 Veronica, a genus of plants and shrubs of the figwort family with blue, flesh-colored, or white flowers; popularly called speedwell; well known species is the long-leaved veronica (*Veronica longifolia*), a tall garden perennial with small violet or blue flowers clustered densely on erect spikes.
 Verrazano (*vě-rāt-sā'nō*), Giovanni da (1480?-1527?), Italian explorer of New World in French service A-145, *map* A-143
 enters New York harbor N-120
 Verres, Gaius, corrupt and rapacious Roman quaestor and propraetor (governor) of Sicily 73-71 B.C.; brought to trial by the people and prosecuted by Cicero. Only two of the seven orations that Cicero wrote against him were delivered because Verres fled, knowing conviction was certain.
 Verrill, Addison Emery (1839-1926), American natural scientist, born Greenwood, Me.; studied fauna of Atlantic and Pacific coasts and marine animals of Bermuda Islands discovers deep-sea scallops E-345
 Verrill, A. Hyatt (born 1871), naturalist and explorer, born New Haven, Conn.; originator of autochrome process of color photography; explorer in Bermuda, West Indies, Panama ('Harper's Book for Young Naturalists'; 'Islands and Their Mysteries'; 'Old Civilizations of the New World')
 Panama discoveries E-346
 Verrocchio (*vě-rōk'h'yō*), Andrea del (1435-88), Italian sculptor, goldsmith, and painter, one of greatest early Renaissance artists; painted famous 'Baptism of Christ' statue of Colleoni I-173, S-58, *picture* E-334
 teacher of Leonardo da Vinci V-300
 Versailles (*vě-sā'lē*, French *vě-sā'yā*), France, suburb of Paris; pop. 75,000; V-288, *map* F-179
 court of Louis XIV L-202
 palace V-289; furniture I-101
 Versailles, Treaty of (1619) W-173-4. *See also* in *Index* Peace Conference of 1919
 German territory lost, *map* G-66
 League of Nations Covenant L-77-8
 revision, demands for W-178, G-78, 76a-b
 United States rejects W-111
 Verschaffelt (*vě-skāf'fēlt*), Pieter Anton (1710-93), Flemish sculptor and architect of baroque style; born in Ghent; trained in Paris and Rome; court sculptor in Germany.
 Verse, a line of poetry; term sometimes incorrectly used for "stanza"; also applied to poetry in general. *See in Index* Poetry.
 Verse, forms of P-270-1
 Iimericks L-138
 Vers libre (*věr lēb'rū*). *See in Index* Free verse
 Verst (*věrst*), Russian measure of distance; 2/3 mi., or 1.07 kilometers.
 Vert, in heraldry H-281
 Verte, famille (*fā-mē'yū vērt*), a Chinese porcelain P-330-1
 Vertebra (plural, vertebrae), any one of the 33 bones of the spinal column S-155, *picture* N-65
 Vertebrates, the backboneed animals V-290, A-199

classified Z-229-30
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 first traces in geology G-40
 skeleton S-154-6
 Vertex, in geometry G-47
 Vertical unions, in labor L-44a
 Vertical trust T-146-7
 Vertumnus (*vě-r-tūm'nūs*), in Roman mythology, a fruit god who watched over plants in their change from blossom to fruit; husband of Pomona.
 Verulamium (*vě-r-ū-lā'mī-ūm*), Roman town in what is now Hertfordshire, England; archeological excavations have revealed a high Roman culture: *picture* A-252
 Ver'vain family, or Verbenaceae (*vūr-bē-nā'sē-ē*), a family of plants, shrubs, and trees including the hemp-tree, verbenas, lantanas, golden dewdrop, lipplias, and teak.
 Verviers (*věrv-yā'*), Belgium, town 15 mi. s.e. of Liège; pop. 45,000; woolen goods, dyes, glass; suffered severely during German occupation 1914-18.
 Very lights, signals of red, green, or white fire shot from a Very pistol; lights are fired in groups, thus indicating a code; used in army and navy; invented 1877 by Lieut. Samuel W. Very.
 Vesalius, Andreas (1514-64), Belgian anatomist A-191
 Vesely, Artem (born 1898), Russian novelist ('My Native Land').
 Vesticant, a blistering poison gas G-24
 Vesle (*vēl*), river of n.e. France; rises n. of Châlons-sur-Marne, flows 80 mi. past Reims to Aisne 7 mi. s.e. of Soissons.
 Ves'pa, genus of wasps and hornets W-35
 Vespasian (*věs-pā'zhi-ān*) (Titus Flavius Vespasianus) (9-79 A.D.), Roman emperor 67-79 A.D., father of Titus and Domitian; in his reign Titus captured and destroyed Jerusalem, the Colosseum was begun, and Agricola extended Roman sway in Britain.
 Vespers, a canonical hour M-233, 234
 Vespers, Sicilian, massacre of French in Sicily (1282) S-140
 Vesper sparrow S-238
 called bay-winged hunting B-273
 care of young B-128
 Vespidae, a family of wasps W-35
 Vespucel (*věs-pūt'chē*) Simonetta Cattaneo (1453?-76), famous Genoese beauty at Medici court in Florence; much painted, particularly after her death; model for Botticelli's 'Birth of Venus': *picture* P-16
 Vespuelus (*věs-pū'shūs*), Amerigo (1451-1512), Florentine navigator for whom America was named V-290, A-143, *map* A-143
 memorials in Florence F-107, I-169
 Ves'ta, in Roman mythology, goddess of the hearth and home; Greek Hestia: V-290-1
 temple at Rome V-291: ruins R-146
 Vesta, an asteroid A-339
 Vesta, a wax match M-86
 Vestal virgin V-291, *picture* V-290
 Vest (*věst*) Fiord, Norway, or West Fiord; separates Lofoden and Vesterålen Islands from mainland, *map* N-173
 Vestig'ial, or rudimentary structures, in human body E-341
 Vestry, in architecture, a room in a church where vestments are kept and where the clergy and choristers robe for services, *diagram* A-267

Vesuvius, Mount V-291-2, V-332, *map* I-156
 buries Pompeii P-299-300

Vetches, various beanlike plants of the genus *Vicia*; used chiefly as soil cover and for forage; broad bean (*Vicia faba*), annual vegetable, has pods up to 18 in. long; spring vetch (*Vicia sativa*) and winter vetch (*Vicia villosa*) are grown as field crops.

Veterans' Administration, U. S. U-231, P-118

Veterans' Bureau, U. S. U-281

Veterans of Foreign Wars of U. S., society of ex-service men who have fought in wars on foreign soil or waters; founded 1899; object to assist needy veterans and dependents, promote comradeship, patriotism.

Veterans' relief P-118

American Legion activities A-178

Civil War H-230, H-253, P-118

Soldiers' Bonus Bill P-118: vetoed C-353, H-337, R-146j

war risk and defense insurance I-95

Veterinary Corps, U. S. Army A-307a

insignia U-178

Veterinary medicine (from Latin *veterna*, beast of burden), the science of caring for diseased or injured domestic animals. The doctors have to be registered by the state; they receive their training in schools of veterinary science.

Vetiver, or khus-khus, a perennial (*Vetiveria zizanioides*) of the grass family, native to Asia, cultivated in America for ornamental purposes and for its aromatic roots used in perfumery.

Veto V-292

British crown P-78

British House of Lords P-78

Canadian governor general C-62

Polish nobles P-276

United States governors S-278: first constitutions A-317

United States president's power (Constitution text) U-213: Cleveland's use of C-266; Jackson's use of J-179

Veto President, the name applied to Grover Cleveland C-266

Vevey (*vū-vē*'), Switzerland, town on Lake Geneva; tourist resort; pop. 18,000; Swiss chocolate; condensed milk.

Vexillum, Roman cavalry flag F-84

Vézelay (*vāz-lē*'), France, village 60 mi. n.w. of Dijon; noted for the Madeleine (12th century), one of largest and most beautiful basilicas in France.

Vézère (*vā-zēr*') River, in s. France; flows 120 mi. to the Dordogne.

Viaduct, long bridge for carrying a road or railroad across a valley or another road; usually built of steel or concrete, in a series of small arches: *picture* S-356

Vianna da Motta (*vē-yān'nā dā mōt'-tā*), José (born 1868), Portuguese pianist and composer, director National Conservatory, Lisbon; chamber music, compositions for orchestra and for piano ('Portuguese Rhapsodies').

Via Sacra (*vē'ā sā'krā*'), street in Rome. *See* Sacred Way

Via Salaria (*sā-lā'rē-ā*) ('salt road'), old road in Italy S-15

Viatium (*vī-āt'i-kūm*), the Holy Eucharist when administered to the dying; originally, money or other provisions for a journey.

Vlaud (*vē-yō*'), Louis Marie Julien. *See in Index* Loti, Pierre

Viborg (*vē'bōrg*). *See* Vilpuri

Vibration period, in physics E-230

Vi'broplex, a telegraph transmitter, *picture* T-39

Viburnum (*vī-būr'nūm*), a genus of shrubs or small trees of the honeysuckle family with dense flat-topped clusters of white or pink flowers; includes various species of arrowwood, the maple-leaved viburnum, the black haw, the wayfaring tree, and the high-bush cranberry, of which the snowball is a cultivated form.

Vicar, a person who acts for a superior; in Church of England, a clergyman in charge of a parish in behalf of the rector.

'Vicar of Bray, The', an English folksong F-134

Vicar of Christ, a title of the pope.

'Vicar of Wakefield', novel by Goldsmith G-115, 116

Vice admiral, of U.S. Navy N-560

insignia, picture U-179

rank created for Farragut F-12

Vicente (*vē-thēn'tā*), Gil (1470?-1538?), "the Portuguese Shakespeare," Renaissance dramatist and lyric poet; a successful goldsmith before he turned to writing; plays range from religious to farcical, and depict both the splendor and squalor of the age; wrote in Spanish as well as Portuguese ('Igneiz Pereira'; 'Amadis de Gaula').

Vicenza (*vē-chēn'tā*), Italy, town on Bacchiglione River 40 mi. w. of Venice; pop. 67,000; produces silk, silk goods; birthplace of Palladio, great 16th century architect.

Vice-president of United States V-292-3. For list of the vice-presidents of the United States *see table* on the following page

becomes president, or acts as president, when U-218

cabinet meetings C-3

Constitutional limits U-213

inauguration changes of 20th amendment U-218

method of election, original U-214: changed by 12th amendment, text U-217

Naval Academy, appointments N-45

salary U-231

Senate, presiding officer of C-334

Viceroy of India I-40

Viohy (*vē-shō*'), town in central France on the Allier River, famous for mineral springs; pop. 25,000; capital of France 1940-; W-178j

Viel kid L-85

Viek, Henry de, 14th-century German clockmaker F-36

Vickers-Maxim machine gun M-6

Vicksburg, Miss., manufacturing and cotton trading city on Mississippi River; pop. 24,460; scene of decisive battle in Civil War: V-293, *map* M-200

Vicksburg, bottle of (1863) V-293, G-132

Porter at P-305

Vicksburg National Military Park, Miss.; established 1899: V-293

Vico (*vē'kō*), Giovanni Battista (1658-1744), Italian philosopher, born Naples; famous for 'Scienza Nuova', a profound and original work on the philosophy of government.

'Vicente de Brogelonne' (*vē-kōn't dū brāzh-lōn'*), novel by Dumas D-119-20

Victor, Saint, Christian martyr at Marseilles M-70

Victor Emmanuel II (1820-78), king of Italy V-294, I-157-8

Garibaldi and G-15, *picture* I-157

Victor Emmanuel III (born 1869), king of Italy V-294

Albanian crown acquired A-107

Mussolini seizes power I-159

Vioto'ria (1819-1901), queen of Great Britain and Ireland V-295-6

castle in Scotland, *picture* S-45

dies at Osborne House V-97

Disraeli's ministries D-71

events of reign, *chart* H-303

Gladstone's ministries G-98

literature, Victorian E-287

mausoleum W-114

Victoria, Australia, state in s.e.; 87,884 sq. mi.; pop. 1,820,000; cap. Melbourne: V-294, *maps* A-372a, b

Victoria, British Columbia, cap. of province; at s.e. end of Vancouver Island; pop. 39,082: V-294-5, *map* C-50b, *picture* B-248

observatory O-194

Victorio, China, city on island of Hong Kong; pop. 580,000: H-332, *picture* C-2210

Victoria, Tex., residential city, 110 mi. s.e. of Austin; pop. 11,566; in region visited by La Salle in 1685; livestock, cotton, oil.

Victoria, Lake (Victoria Nyanza), in e. cent. Africa, 2d largest freshwater lake in world; 28,000 sq. mi.: V-297, A-38, *maps* A-42a, b, E-139

Victoria, Mount, Canada, in s.e. British Columbia, overlooking Lake Louise; height 11,500 ft.: *picture* C-48

Victoria and Albert Museum, London, *table* M-393

Victoria Cross, British decoration D-32

Victorio Falls, Africa, world's greatest cataract; in Zambezi River, Rhodesia: V-296-7, *map* A-42a

Victoria Island, Canada, large island in Arctic Ocean n. of provisional district of Mackenzie; about 80,000 sq. mi.: *map* C-50b

Victoria Land, Antarctica. *See in Index* South Victoria Land

Victorian Age, in English literature E-287

Victoria Nile, or Somerset Nile N-146

Victoria Nyanza. *See in Index* Victoria, Lake

Victorian Order, Royal, English order of knighthood instituted by Queen Victoria in 1896.

Victorio regia, a giant water-lily W-47, *picture* W-47

Victoria River, rises in the w. of Northern Territory, Australia, and flows n. and w. entering the Indian Ocean by a wide estuary called Queen's Channel.

Victoria Street, London, *picture* L-185

Victoria Tower, Houses of Parliament, London, *picture* L-183

Victoria University. *See in Index* Toronto, University of

Victoriaville, Quebec, manufacturing town and farm center 90 mi. n.e. of Montreal; pop. 6218; furniture, foundry and saw-mill products, maple syrup: *map*, inset C-50c

Victor of the Marne, name given to General Joffre J-220

'Victory', flagship of Admiral Nelson N-63

Victory, Temple of. *See* Wingless Victory

Victory Corps, High School N-12f

Victory Liberty Loan, U.S. W-170

Victory Medal, United States medal of honor D-31-2

'Victory of Samothrace', or 'Nike of Samothrace'. *See* 'Winged Victory'

Victory tax N-12g

Vietron, a synthetic plastic P-246

Vicuña (*vē-kūn'yā*), a camel-like animal of South America A-134

Vicuña cloth, a fabric made of vicuña wool; name sometimes applied to a soft fabric made of other wool.

THE VICE-PRESIDENTS OF THE UNITED STATES

NAME	TERM	STATE	PARTY	PRESIDENT
John Adams	1789-1797	Massachusetts	Federalist	George Washington
Thomas Jefferson	1797-1801	Virginia	Democratic-Republican	John Adams
Aaron Burr	1801-1805	New York	Democratic-Republican	Thomas Jefferson
George Clinton†	(1805-1809) 1809-1812	New York	Democratic-Republican	(Thomas Jefferson James Madison)
Elbridge Gerry†	1813-1814	Massachusetts	Democratic-Republican	James Madison
Daniel Tompkins	1817-1825	New York	Democratic-Republican	James Monroe
John C. Calhoun	(1825-1829) 1829-1832	South Carolina	Democratic-Republican	(John Quincy Adams Andrew Jackson)
Martin Van Buren	1833-1837	New York	Democrat	Andrew Jackson
Richard M. Johnson	1837-1841	Kentucky	Democrat	Martin Van Buren
John Tyler*	1841-1841	Virginia	Democrat	William Henry Harrison
George M. Dallas	1845-1849	Pennsylvania	Democrat	James K. Polk
Millard Fillmore*	1849-1850	New York	Whig	Zachary Taylor
William R. King†	1853-1853	Alabama	Democrat	Franklin Pierce
John C. Breckenridge	1857-1861	Kentucky	Democrat	James Buchanan
Hannibal Hamlin	1861-1865	Maine	Republican	Abraham Lincoln
Andrew Johnson*	1865-1865	Tennessee	Republican†	Abraham Lincoln
Schuyler Colfax	1869-1873	Indiana	Republican	Ulysses S. Grant
Henry Wilson†	1873-1875	Massachusetts	Republican	Ulysses S. Grant
William A. Wheeler	1877-1881	New York	Republican	Rutherford B. Hayes
Chester A. Arthur*	1881-1881	New York	Republican	James A. Garfield
Thomas A. Hendricks†	1885-1885	Indiana	Democrat	Grover Cleveland
Levi P. Morton	1889-1893	New York	Republican	Benjamin Harrison
Adlai E. Stevenson	1893-1897	Illinois	Democrat	Grover Cleveland
Garret A. Hobart†	1897-1899	New Jersey	Republican	William McKinley
Theodore Roosevelt*	1901-1901	New York	Republican	William McKinley
Charles W. Fairbanks	1905-1909	Indiana	Republican	Theodore Roosevelt
James S. Sherman†	1909-1912	New York	Republican	William H. Taft
Thomas R. Marshall	1913-1921	Indiana	Democrat	Woodrow Wilson
Calvin Coolidge*	1921-1923	Massachusetts	Republican	Warren G. Harding
Charles C. Dawes	1925-1929	Illinois	Republican	Calvin Coolidge
Charles Curtis	1929-1933	Kansas	Republican	Herbert Hoover
John N. Garner	1933-1941	Texas	Democrat	Franklin D. Roosevelt
Henry A. Wallace	1941-	Iowa	Democrat	Franklin D. Roosevelt

*Succeeded to presidency

†Died in office

†Democrat elected on Republican ticket.

Vidalita (v6-d6-l6-t6), type of ballad sung by gauchos L-676

Vidin (v6-d6-n), Bulgaria, fortified town on Danube River; pop. 19,000; fruits, cereals, gold and silver filigree; map B-18

Viebig (f6-b6-k), Clara (born 1860), German novelist; G-63

Vienne (v6-n6), Germany, also Wien, chief city of Ostmark, on Danube River; pop. 1,920,000; V-297-8, map E-326d, picture A-378

apartment house, picture S-113
art galleries and museums V-297, table M-392, 393
history V-298; Turks besiege (1529 and 1689) T-162, 163
manufactures and commerce V-298
university U-260

Vienno, Congress of (1814-15) V-298
Alexander I at A-113
Cracow a republic C-390
diplomatic service organized D-71
Germany G-72; Prussian gains, map P-359; Saxony S-34

Netherlands independent N-73
slave trade abolished S-161
Swiss neutrality guaranteed S-351
Talleyrand's influence T-8
territorial changes E-324

Vienna, Peace of (1738), between France and Austria; closed War of Polish Succession; Lorraine guaranteed to France.

Vienne (v6-n6), France, ancient town on Rh6ne 17 mi. s. of Lyons; pop. 25,000; varied manufactures; large

trade; fortified by Caesar 47 B.C.; Roman aqueducts; many antiquities.

Vieuxtemps (v6-y6-t6-n), Henri (1820-81), Belgian violinist and composer; professor at St. Petersburg (Leningrad) and Brussels; made concert tours throughout Europe and in U. S.; famous both as virtuoso and as teacher; compositions for violin still played.

Vievwinder, of camera C-59

Vig6e-Lebrun, Elizabeth. See in Index
Lebrun, Elizabeth Vig6e-

Vigeland (v6-g6-l6-n), Adolf Gustav (born 1869), Norwegian sculptor; early works were semi-impressionistic; he later followed the more classic forms of sculpture.

Vigilantes, or vigilance committees L-223

Vigils, evening devotions; also the evening service preceding certain festivals, or the day before these festivals.

Vigny (v6-n6-y6), Alfred de (1797-1863), French poet and dramatist; though he wrote relatively little, his fame is secure; some of his most famous poems ('Eloa'; 'Dolorida'; 'Molse') antedated and tremendously influenced Hugo and the Romantics; wrote 'Cinq Mars', a historical novel, famous in its day but now little read, and 'Chatterton', a drama based on the life of the ill-fated poet.

Viigo (v6-g6), seaport and naval station in n.w. Spain, on Viigo Bay; fine harbor; flour, paper, soap, leather; pop. 69,000; map S-226

Vipuril (v6-p6-r6), also Vipuri or Viborg, a city and seaport on Gulf of Finland; connected by canal with inland lakes; pop. 70,000; map E-326e

Vijayanagar (v6-j6-a-n6-g6-r), or Bijanagar, ancient Hindu kingdom of s. India 1336-1565; stronghold against Mohammedans; immense ruins of city of Vijayanagar in Madras Presidency, 86 mi. n.w. of Bellary, preserved by British government.

Vikings (v6-k6-n-g6, or v6-k6-n-g6) ("pirates"), or Northmen N-166-70. See also in Index Northmen

Viking ship, pictures N-168, S-125

Vilayet (v6-l6-y6-t6), Turkish governmental unit T-165

Villa (v6-y6), Francisco, or "Pancho" (1868-1923), Mexican revolutionist and bandit; made peace 1920 with Mexican government; M-142e, b

Villa Concepci6n, Paraguay. See in Index Concepci6n

Villacres, Cesar (born 1880), Ecuadorian painter; noted for portraits, historical paintings, and Indian studies; L-676

Villa Franca (v6-y6-fr6-n6-k6), town in Azores; in 1522 volcanic earthquake buried it with 6000 inhabitants.

Key—ape, 6t, f6r, f6st, wh6t, f6ll; m6, y6t, f6rn, th6r6, f6e, b6t; r6w, w6n, f6r, n6t, d6; e6re, b6t, r6de, f6ll, b6rn;

Villafrañca (vē'lā frān'kā), Italy, town 10 mi. s.w. of Verona; pop. 12,000; preliminary treaty of peace ending war between Franco and Austria signed here (July 11, 1859): G-15, V-294

Village government M-302

Villa-Lobos, Heitor (born 1890), Brazilian composer; his works, modern and original, are based often on folk-music; composed symphonic and piano works, suites for children.

Villa Maria College, at Erie, Pa.; Roman Catholic institution for women, founded 1925; arts and sciences.

Villanelle, verse form derived from the French, consisting of five three-line stanzas (tercets) and a final quatrain and employing only two rhymes; first line closes second and fourth stanzas and appears as second last line of final quatrain; last line of first stanza closes third, fifth, and last stanzas; example: Dobson's 'When I Saw You Last, Rose'.

Villanova College, at Villanova, Pa.; Roman Catholic institution for men, founded 1842; arts and sciences, commerce and finance, engineering.

Villanovans, name given by archeologists to certain tribes of the early Iron Age in Italy; so called from the little village of Villanova, near Bologna, where excavations revealed burial urns of rough pottery and many articles of excellent metal work.

Villard, Henry (1835-1900), American journalist and financier, born Speyer, Bavaria (name originally Hilgard); came to U. S. 1853; was correspondent during Civil War and Austro-Prussian War; organized Oregon Railway and Navigation Company and gained control of Northern Pacific, main line to Pacific being completed under his direction; bought controlling interest in New York *Evening Post* and *The Nation*.

Villard, Oswald Garrison (born 1872), American journalist; born Wiesbaden, Germany; son of Henry Villard; grandson of William Lloyd Garrison, abolitionist; publisher New York *Evening Post* (1897-1918); editor *The Nation* 1918-33 ('Prophets True and False'; 'Germany Embattled'; 'Fighting Years: Memoirs of a Liberal Editor').

Villarrica (vē-yā-rē'kā), Paraguay, 90 mi. s.e. of Asunción, on Central Paraguayan Railway, in agricultural region; pop. 80,000; tobacco, cotton, sugar cane, maize, wine, timber: map S-208c

Villars (vē-lār'), Claude Louis Hector, Duc de (1658-1734), marshal of France, one of greatest French generals; commanded against Eugene and Marlborough in War of the Spanish Succession.

Villehardouin (vē-lār-āwān'), Geoffroi de (1160?-1213?), French historian, known for vivid, human account of Fourth Crusade, in which he took part ('Conquête de Constantinople').

Villein (vil'in), or serf, under feudalism S-160-1, F-27, 29

farm holding, picture A-59

Peasants' Revolt in England T-171-2

Villi (singular, villus), hair-like projections of the intestine: P-208-7

Villiers (vil'ērs), George. See in Index

Buckingham, George Villiers, Duke of

Villon (vē-yōn'), François (1431-?), greatest of French medieval poets, a vagabond rascal, who escaped hanging only by great luck ('Petit testament'; 'Grand testament'): F-196

Vilna (vē'lā), Lithuania. See in Index

Wilno

Vin'nal Hill, Rome R-144

Vimy (vē-mē') Ridge, a high ridge 4 mi. n.e. of Arras, scene of 1st World War battles; taken by Germans 1940: A-310, map W-151

Vina del Mar (vē'nyā dēl mār), Chile, beautiful residential suburb of Valparaíso; pop. 50,000: C-207c, map C-206

Vinalia, Roman holiday, now celebrated as Martinmas H-323

Vinca (ving'kā), the periwinkle genus of plants. See in Index

Periwinkle

Vineennes (vān-sēn'), France, military town adjoining Paris on s.e.; pop. 49,000; early porcelain factory; celebrated castle begun 1164, long a state prison, now a fort, arsenal, and barracks.

Vincennes (vin-sēnz'), Ind., railroad city on Wabash River 55 mi. s.w. of Terre Haute; pop. 18,228; oldest town in state; structural steel, shoes, glass; coal-mining: map I-46

capture celebrated H-320

Clark captures (1779) C-259

settled I-50

Vincent, or Vincentius, Saint, martyr and deacon of the church; of noble Spanish family; martyred under Emperor Diocletian; festival January 22.

Vincent, George Edgar (1864-1941), American educator, born Rockford, Ill.; long connected with Chautauqua Institute; president University of Minnesota 1911-17; president Rockefeller Foundation until 1929.

Vincent, John Heyl (1882-1920), Methodist Episcopal bishop, born Tuscaloosa, Ala.; founder of Chautauqua system: C-163

Vincent de Paul (vān-sāh' dū pōl'), Saint (1576-1660), French priest, founder of Lazarists, a missionary order; famed for his benevolent work; founded Sisters of Charity; established hospital for galley slaves at Marseilles, two homes for foundlings at Paris; feast day July 19.

Vinci, Leonardo da (lā-ō-nār'dō dū vēn'chē) (1452-1519), Italian painter V-299-300

drawing, picture D-100

flying machine, picture A-66

fresco painting, method P-15

'Last Supper' V-300, picture V-299

'Mona Lisa' V-300, picture B-333

Vindeln. See in Index

Windol

Vindhya (vin'dī-ā), range in central India; highest point 5000 ft.

divides Brahman nations I-36

Vindom'ina, ancient Celtic village on site of Vienna V-298

Vine, any climbing or creeping plant of the genus *Vitis*, Outline N-41

Vinegar V-300

bacteria, picture B-12

fermentation process F-24, V-300

tarragon S-251

white lead manufacture P-32

Vinegar Bible B-105

Vinegar eel, a small worm W-180b

Vinland, or "Wineland," Norse name for North America N-168

Vinson, Frederick Moore (born 1890), judge, born Louisa, Ky.; U. S. congressman 1923-39; appointed associate justice U. S. Court of Appeals for D.C. 1987; made director

Office of Economic Stabilization May 1943.

Vinylite (vē'nīl-īt), a plastic P-246

Vinyl (vē'nīl) resins P-245f, 246

laquers L-51; solvent L-52

Vinyon, a silklike synthetic fiber P-245f, F-30

Viol (vē'āl), family name for stringed musical instruments, predecessors of the modern violin, viola, violoncello, and double bass.

Viola, heroine of Shakespeare's 'Twelfth Night'; wrecked on coast of Illyria, she dons page disguise and enters service of Duke Orsino, with whom she falls in love.

Viola, stringed musical instrument V-302, M-323

place in orchestra O-240

Viola, genus of plants including violet and pansy.

Violaceae (vē-ō-lā'sē-ē), the violet family.

Violet, a flower V-300-1, color plate B-283b

Violet, color, chart C-308o

eye reaction C-308j

mixtures C-308f-i

place in spectrum, picture C-308a

primary color, color chart C-308h

wave-length of light S-242

Violet clavaria, a mushroom, color plate M-306a-b

Violet cress. See Ionopsisidium

Violet-green swallow S-332

Violin, stringed musical instrument V-301-2, picture M-322

Amati and Stradivari V-302

materials used in making V-302

physical nature M-323

pitch explained S-196

place in orchestra O-240

range of, picture S-198

Viollet-le-Duc (vē-ō-lē' lū dūk), Eugène Emmanuel (1814-79), French architect, archeologist, critic, scientist, chief prophet of the Gothic revival in architecture, who revealed to the modern world the logic and beauty of the despised "barbarous" medieval construction; restored Carcassonne.

Violoncello (vē-ō-lōn-chē'lō), or cello, a musical instrument V-302, O-240, picture M-322

range of, picture S-198

Vionville (vē-ōn-vē'l'), battle of. See in Index

Mars-la-Tour

Vipers, various venomous snakes V-302-3, S-171, picture S-171

Vipers-bugloss, or Echium, a genus of plants and shrubs of the borage family with erect hairy stems and showy spikes of blue, violet, red, or white flowers; one common species is a weed called blue-weed or blue-devil, formerly used in medicine.

Vipurul. See in Index

Vipurul

Virohow (fēr'kō), Rudolph (1821-1902), German pathologist, anthropologist, and archeologist; established doctrine that disease is a phenomenon of the body cells primarily; directed notable improvements in sanitation of Berlin; was also active in politics.

Vireo, or greenlet, an olive-colored bird V-303

blue-headed V-303, picture N-33

camouflaged nest B-128

red-eyed V-303, color plate B-139

seasonal migration M-163

white-eyed V-303

Vireonidae, vireo family of birds B-132

Virgil. See in Index

Vergil

Virgilia. See in Index

Yellow-wood

Virgin, vestal V-291, picture V-290

Vir'ginal, a keyed musical instrument P-209, M-310, *picture* P-210

Virg'in'la, heroine of St. Pierre's romance 'Paul and Virginia', embodiment of innocence and naiveté.

Virginia, in Roman legend, daughter of centurion Virginius, who killed her to prevent her falling into hands of Appius Claudius the decemvir (499 B.C.).

Virginia, a middle Atlantic state of U. S.; 40,815 sq. mi.; pop. 2,677,773; cap. Richmond: V-303-9, *maps* V-306, U-188c

agriculture and stock raising V-304, 306

bird, state B-122

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church and state A-155

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Raleigh's expeditions R-49

Jamestown settled (1607) J-183, V-307; John Smith S-165

colonial hardships A-153

slavery introduced N-62, A-157

postal service established P-320

Bacon's Rebellion (1676) B-11

Washington family settles in W-12-13

French and Indian War F-194: Washington W-15

Patrick Henry H-279-80

proposes Declaration of Independence D-23

Jefferson's reforms J-208

Clark in Northwest C-259

Cornwallis surrender at Yorktown R-91-2

Potomac navigation dispute U-206

first Sunday school S-330

struggle over federal constitution: Patrick Henry opposes H-280; "Virginia plan" devised by Madison U-207-8, M-19; Marshall supports M-71; Monroe opposes M-240

ratification of Constitution U-209

Kentucky forms separate government K-13

nullification resolutions A-14: Madison writes M-19

part of District of Columbia returned (1846) W-27-8

John Brown's raid B-250

tries to avert Civil War C-251

secession V-309; Tyler T-171

West Virginia separated W-77

Civil War: Bull Run B-271; Peninsular campaign M-3; Fredericksburg F-193; Chancellorsville C-139; the Wilderness L-92; Winchester S-114-15; fall of Richmond R-107; Lee's surrender L-92

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Mount Vernon M-292-3

name, origin, and nickname V-307, S-279

national park and monuments N-20, 21, 22a, o, d, e, f, *pictures* C-117, V-308, W-104, 104b

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tobacco and cigar industry V-304, T-103, R-107

Virg'nia, Minn., iron-mining, lumbering, and agricultural center 55 mi. n.w. of Duluth; pop. 12,264: *map* M-192

Virginia, University of, at Charlottesville

ville; state control; opened 1825; graduate department, schools of education, engineering, law, medicine: *picture* V-308b

established by Jefferson J-208

Madison bequeaths library M-20

'**Virginia**', Confederate ironclad M-225, *picture* C-255

Virginia and Kentucky Resolutions S-279

Virginia City, Mont., old gold mining town, 88 mi. s. of Helena; pop. 380; had great boom in Civil War times; first incorporated town in Montana (1864). Was headquarters for notorious gang of outlaws who robbed and murdered miners and held up stage-coaches carrying gold shipments; most of the gang were hanged by vigilantes (1864-65). Thompson Museum has relics from town's early days: *map* M-243

Virginia City, Nev., town about 20 mi. s.e. of Reno; once great mining center, made famous by the Comstock Lode, silver mines discovered in 1859; much of old town has disappeared; later mining activity consists chiefly in working surface ores and in reworking waste from old mines: N-77, *map* N-77

Virginia Company of London. *See in Index* London Company

Virginia Company of Plymouth. *See in Index* Plymouth Company

Virginia Conventions (1774-76), adopted important resolutions affecting struggle for independence V-308

Virginia cowslip. *See in Index* Lungwort

Virginia creeper, American ivy, or woodbine, a creeping vine V-309

poison ivy distinguished P-272, *picture* I-176

Virginia deer, a white-tailed species D-36, *picture* D-37

Virginia Military Institute, at Lexington, Va.; state institution for men, founded 1839; arts and sciences, engineering, chemistry: *picture* V-308b

'**Virginians**, The', novel by Thackeray (sequel to 'Henry Esmond') which treats of colonial times; two grandsons of Esmond take part in American Revolution on opposite sides.

Virginia Plan, for U. S. Constitution U-207-8, M-19

Virginia Polytechnic Institute, at Blacksburg, Va.; state institution founded 1872; agriculture, engineering, graduate school.

Virginia rail, a small marsh-dwelling bird, *picture* R-35

Virginia Resolutions A-14, S-279

Madison writes M-19

Virginia State College for Negroes, at Ettrick, Va.; founded 1882; agriculture, arts and sciences, education, home economics, mechanic arts, graduate school.

Virginia stock. *See in Index* Maloomia

Virginia Union University, at Richmond, Va.; Baptist institution founded 1865; for Negroes; arts and sciences, theology.

Virgin Islands, West Indies, 40 mi. e. of Puerto Rico; owned by Great Britain and U. S.; 191 sq. mi.; pop. about 31,000: V-309, *maps* W-72c, inset N-150c

citizenship of inhabitants C-239

U. S. naval bases N-52, *map* N-51

Virginium, chemical element C-167, 176, *table* C-168

Virginius, in 'Canterbury Tales' C-161

Virginius Massacre, execution of 53 men of American-owned vessel *Vir-*

ginius by Spanish authorities in 1873 because ship carried arms and men to Cuban rebels; event brought U. S. and Spain close to war; later proved that *Virginius* flew American flag unlawfully.

Virgin Mary J-213-14, M-20. *See also* in *Index* Madonna

Virgin's bower, white clematis C-262

Virgo (*vēr'gō*), or **Virgin**, a constellation and sign of the zodiac Z-218, *chart* S-275c

Virtual Image L-126

Virtuoso, in music, one highly skilled in the playing of an instrument.

Viruses, complex chemical substances causing certain diseases of plants, animals, and man G-77

diseases of man G-78, 80

plant diseases P-245c-d

Visa (*vē'sā*), or **visé** (*vē-zā'*) (French "seen") P-85-6

Visby (*vēs'bū*), or **Wisby**, cap. of Swedish island of Gotland in Baltic; important even in Stone Age as trading post; notable iron works in medieval times; member Hanseatic League; interesting remains of 11th to 14th centuries including ancient walls, churches; pop. 11,000.

Viscaria, a perennial plant (*Lychnis viscaria*) of the pink family, native to Eurasia. Grows to 18 in.; somewhat hairy; gray, with leaves small, narrow; flowers small, flat, red, sometimes white or striped, growing in short-stemmed clusters; also called German catchfly.

Vis'cera, the internal organs of the body P-206

Visch'er, Peter, the Elder (1455?-1529), foremost German bronze sculptor, born Nuremberg; work shows transition from Gothic to Renaissance style in art; worked with his five sons; his masterpiece, 'Shrine of St. Sebald' in Nuremberg; also notable 'Theodorico' and 'King Arthur', two statues on tomb of Emperor Maximilian at Innsbruck.

Viseonti (*vēs-kōn'tō*), celebrated Italian family; ruled Milan 1277-1447: I-165-6

Vis'coso, a form of cellulose xanthate C-123, P-245f

rayon R-55, *pictures* R-54

sponges S-262

Viscos'ity, the tendency of all bodies—solids, liquids, or gases—to resist any force tending to change their shape or the arrangement of their parts instantaneously L-211

Viscount (*vi'kount*), a title D-34

Visé (*vē-zā'*), or **visa** (*vē-zā'*) (French "seen") P-85-6

Vishnu (*vīsh'ng*), 3d of the Hindu supreme triad of gods H-293

Visibility, relation to distance A-124

Visible items, in international trade I-110b-c

Visible spectrum, of light S-243

Visible speech, system of teaching articulation to the deaf D-22

Vis'igoths, or **West Goths** G-123

Alaric A-99

kingdom in Spain G-123, S-229:

kings' crowns G-25, *picture* G-27

Vision. *See in Index* Eye

'**Vision of Piers Plowman**'. *See in Index* Langland, William

'**Vision of Sir Launfal**, The', poem by Lowell, based on an Arthurian legend, in which a young knight dreams that after a long search for the Holy Grail it is revealed to him at his own gate when he relieves sufferings of a fellow man.

Visit and search, in international law

Key—cāpe, āt, fār, fāst, whāt, fāh; mē, yēt, fērn, thērē; tōe, bīt; rōw, wōn, fōr, nōt, dō; cūre, būt, ryde, fūll, bām;

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 War of 1812 W-8
 World War, first W-167
 Visiting professor, in a college U-258
 Vistanex, rubberlike substance R-170
 Vis'tula River, in central Europe
 V-309, map G-66
 Warsaw on W-11
 Visual broadcasting, by television and telephotography T-41-2, P-179
 Visual center, in brain E-350
 Visual purple, in retina E-350
 Vitaceae (*vi-tă'se-ē*). See in Index Grape family
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 origin of word V-311b-12
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 synthetic V-312
 ultra-violet rays produce vitamin D V-311a, 312, pictures R-15, H-371
 'Vita Nuova' (*ve'ttā nō-d'vū*) ("New Life"), work by Dante; prose interspersed with short poems; fine verse translation into English by D. G. Rossetti: D-11, 12
 Vitebsk (*vet-yēbsk'*), city in w. Russia, on Dvina River, 325 mi. s. of Leningrad; pop. 170,000; railroad center: map E-326b
 Vitelline capsule, in bird's egg, picture E-192
 Vitellius, Aulus (15-69 A.D.), Roman emperor during 69, chosen by army; defeated and slain by troops of Vespasian.
 Viterbo (*ve-tēr'bō*), Italy, historic walled town 88 mi. n.w. of Rome; pop. 86,000; Gothic cathedral and churches with tombs of several popes; celebrated sulphur springs, Etruscan antiquities near by.
 Viti Levu (*ve'tē lā'vū*), largest of Fiji Islands; 4053 sq. mi.: F-33, maps P-10b, A-372a
 Vitis vinifera (*vi'tis vi-nif'er-ā*), current grape C-414
 Vitoria (*ve-tō'ri-ā*), Spain, city in n. center 32 mi. s.e. of Bilbao; pop. 41,000; varied manufactures; victory of Wellington 1813, freeing Spain from French rule: map S-226
 Vitreous electricity E-221, 231
 Vitreous humor, of the eye E-349
 Vitriol, blue, copper sulphate S-324, C-361
 Vitriol, green, iron sulphate S-324 in ink I-79
 Vit'riol, oil of S-324. See also in Index Sulphuric acid
 Vitruvius (Marcus Vitruvius Pollio), Roman architect of first century A.D.; 10-vol. work, 'On Architecture', discovered in 15th century, used as guide in Renaissance.
 Vittorio-Veneto (*vet-tō'rē-ō vā'nā-tō*), battle of (1918) W-165
 Vi'tus, Saint, Christian martyr under the Emperor Diocletian; festival day June 15; invoked by sufferers of chorea, or St. Vitus' dance.
 Vivaldi (*ve-vā'dē*), Antonio (1678?-1743?), Italian priest, violinist, and composer; director Conservatorio della Pietà, Venice: model

for Bach; wrote concertos for violin, quintets, operas.
 Viva voce (*vi'vā vō'sē*) voting B-32
 Viviani (*ve-ve-ā-nē*), René (1863-1925), French Socialist statesman, born Algeria; premier (1914-15) on outbreak of 1st World War; sat continuously in Chamber of Deputies after 1893 except 1902-06; frequently a cabinet officer, and always a leader of the "left."
 Vivip'arous animals, those bearing living young E-192
 fish F-71
 insects I-86
 lizards L-172
 snakes S-173
 Vizeafno (*vēth-kā-ē'nō*), Sebastián, 16th-century Spanish merchant-explorer; organized company to explore Gulf of California, reputedly rich in pearls; undertook several voyages (1594-1603) and discovered Monterey Bay; made first maps and first scientific exploration of west coast.
 Vizier (*vi-sēr'*) (sometimes wazir), title of high officials in Mohammedan countries, particularly in old Turkish empire.
 Vlaardingen (*vlar-ding'ūn*), Netherlands, old town and river port on Maas, 6 mi. w. of Rotterdam; pop. 27,000; center of Dutch fisheries.
 Vlach (*vlāks*), a Latin race of s.e. Europe, north and south of the Danube from Bug River to Adriatic Greece G-184
 Vladimir (*vla-dēr'mēr*), Saint (died 1015), "the Great," grand duke of Kiev, first Christian sovereign of Russia; married a Byzantine princess and introduced Greek Orthodox church into Russia: K-16
 Vladivostok (*vla-d-i-vōs-tōk'*), chief seaport of Siberia; pop. 205,000: V-312-13, map A-332b
 Vlaminck (*vla-mīnk'*), Maurice de (born 1876), French painter, born Paris; known for richly colored, often somber, landscapes.
 Vlissingen (*vis'ing'en*), Netherlands. See in Index Flushing
 Vlorë (*vlo'rē*), also Valona, Avlona, port of Albania; pop. 9000: A-107, map B-18
 V-mail, a mail service for sending letters in compact form to and from American armed forces serving outside continental U. S. P-322
 Vocabulary
 average used S-245, chart S-246-7
 factor in conversation C-347c
 importance in reading R-56-7
 Vocal cords V-331
 Vocalization, in reading R-56
 Vocal Memnon, name given by Greeks to statue of Egyptian king, Amenhotep III, at Thebes: M-112, picture E-209
 Vocal organs V-330-1
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 Vocational education V-313-15. See also in Index Agricultural education; Vocational guidance
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 Y.M.C.A. and Y.W.C.A. Y-208, 209
 Vocational psychology P-361
 Vod'ka, intoxicating Russian beverage, usually made from potatoes, corn, or rye malt.
 Vogau (*vō'gou*), Boris Andreovich. See in Index Pilnyak, Boris
 Vogelwede, Walther von der. See in Index Walther
 Vogler (*fōg'lēr*), George Joseph (generally known as Abbé or Abt) (1749-1814), German organist, musical theorist, and composer; studied in Italy and took holy orders; was court conductor and established famous school at Darmstadt, where Weber and Meyerbeer were his pupils; invented kind of organ called "orchestration" and introduced innovations in technique; subject of poem by Browning.
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 Voice, of animals. See in Index Animals, subhead communication
 Voice, of verb V-281, 282
 passive weak form W-189
 Voice coil, in loudspeaker, picture R-24
 Voices, or parts, in musical composition M-309-10, 312
 Voile (*voil*), a transparent, thin, clinging fabric of plain weave made of cotton, silk, rayon, or wool; very durable.
 Volapük (*vō-lā-pük'*), a universal language E-303
 Volatile oils F-19
 Volatility, of liquids W-44
 Volcanic ash and soil S-191, V-331, M-185
 Central America C-132
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ü=French u, German ü; gem, /o; thin, /hen; ã=French nasal (Jean); zh=French j (z in azure); K=German guttural oh

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 Idaho, extinct cones, *picture* I-10
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 South America S-208e: Colombia, *picture* C-307
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 United States V-332: Lassen Peak, California C-30
 Vesuvius V-291-2
 Vole, name applied to various rodents, especially the field mouse M-233
 Volendam, Netherlands, picturesque village, 12 mi. n. of Amsterdam costume, *picture* N-67
 Volga-Don Canal V-334
 Volga River, Russia, greatest river of Europe V-334, E-318, *map* E-326e
 Volkhof (vól'kóf) River, in n.w. Russia; issues from Lake Imer near Novgorod, flows n.e. 130 mi. to Lake Ladoga.
 Volley ball, game similar in play and scoring to tennis but played with much larger heavier ball and with the palm of the hand instead of a racket. The net is elevated and usually has movable supports. Players vary from 10 to 50, equally distributed on either side.
 Volo, Greece (Greek Volos), seaport on e. coast; pop. 41,000; ancient ruins near by: *map* B-18
 Volscians (vól'shāns), ancient Italic tribe; dwelt in Latium, s.e. of Rome; gradually disappeared after war with Romans 489-450 B.C.: R-132
 Volstead, Andrew J. (born 1860), American legislator; congressman from Minnesota 1908-28; author of the Volstead Act.
 Volstead Act (1919), law providing for strict enforcement of the 18th or prohibition Amendment; defined intoxicants as drinks containing $\frac{1}{2}$ of 1 per cent or more of alcohol: P-350
 Volungs (vól'sungz), in Norse mythology, heroic race descended from Odin, from which sprang Sigurd, story told in the 'Volsunga Saga' and William Morris' 'Story of Sigurd the Volsung'.
 Volt (vólt), the unit of electric potential difference or electromotive force E-222, *pictures* E-223, 224

Volta (vól'tā), Alessandro, Count (1745-1827), Italian physicist; was professor of physics at Como and Pavia; traveled extensively in Europe meeting many scientific men; honored by Napoleon, who made him a count and senator; noted for inventions in electricity, which include voltaic pile, cell, and battery: E-232, *picture* E-231
 electric cell E-214
 volt named for E-222
 Volta Bureau for the Increase and Diffusion of Knowledge Relating to the Deaf D-22, E-94
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 electric coils E-215, E-239
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 street railway lines S-307-8
 transformers change T-119
 Voltaic cell, or galvanic cell, device for producing electric current chemically E-214, E-232
 Voltale pile E-232
 Voltaire (vól'tér'), (François Marie Arouet) (1694-1778), French philosopher and writer V-334-5, F-197, *picture* F-196
 character W-186
 Frederick the Great and F-192
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 Volterra (vól'tér'rā) (ancient Volaterrae), Italy, 30 mi. s.w. of Florence; pop. 21,000; alabaster objects, salt, chemicals; once powerful Etruscan city.
 Voltmeter, an instrument for measuring the voltage or difference of electric potential between two points G-2
 symbol for, in radio R-24
 Volturno (vól'tór'nō) River, in s. Italy; rises on w. slope of Apennines; flows s.w. 100 mi. to Tyrrhenian Sea: *map* I-156
 Volume, a book, origin of word B-175
 Volume, in physics P-189
 gases, laws of G-18
 geometry G-49
 units of measure, *tables* W-67-9
 Volumetric analysis, in chemistry C-174
 Voluntary actions, in psychology W-98-9
 Voluntary muscles M-304-5
 Volunteers, citizens serving country in military capacity of own free will; idea of large volunteer force originated in England in 1757.
 Volunteers of America, a religious and philanthropic organization; membership in U.S., about 8000: S-20
 Volunteer State, Tennessee T-48
 Volvox, a greenish fresh-water organism, composed of similar cells gathered into a spherical colony; sphere rotates incessantly.
 Vomer, a bone of the nose S-158
 Vondel, Joost van den (1587-1679), Dutch poet, greatest of his time; born Cologne; best known for tragic dramas on Biblical and historical subjects; also wrote satirical poetry ('Lucifer'; 'Palamedes'; 'Maria Stuart').
 Vonnoh, Beatie Potter (born 1872), American sculptor, born St. Louis, Mo.; portrays mothers and children and young women with delicate skill ('Mother and Child'; 'Allegresse').
 Voodoo, magical rites based on superstitions and strange beliefs among certain Negro races M-30, 32
 Haiti H-198
 Vorarlberg (fór-är'l'bérk), province in w. corner of former Austria ad-

joining Switzerland; 1005 sq. mi.; pop. 140,000; Alpine forest.
 Voroshilov (vó-ró-shé'lof), Klementil (born 1881), Russian general; first marshal and chairman defense committee in 2d World War; vice-premier; as Commissar for Defense 1925-40 built up Soviet army, navy, and air force; appointed to command Siberian forces of army 1941.
 Voroshilovsk. *See in Index* Stavropol
 Vorticella, a genus of bell-shaped protozoa, popularly called "bell animalcules."
 Vosges (vósh), department of Lorraine; area 2279 sq. mi.: A-187
 Vosges Mountains, of e. France V-336, *map* F-179
 Voss, Johann Heinrich (1751-1826), German poet, best known for translations of Homer, Vergil, Shakespeare, and Horace; in 'Luise', one of his famous 'Idylls' and his most famous poem, he expressed a German theme in classical style.
 Voting E-213-14, S-318-19. *See also in Index* Elections; Suffrage unit rule P-292
 Voting machine B-32
 Voussour (vó-swúr'), of arch, *picture* A-249
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 Post and Gatty flights, *table* A-74
 within the Arctic Circle A-189, 190
 Voyageurs (vó-d-yá-zhúr') (French for "travelers"), French Canadians employed to carry men and goods, especially between the fur-trading posts: F-228
 Voyvodina (vó-vó'd'i-ná), district in Yugoslavia, formerly part of Hungary; population a mixture of Slavs, Germans, Magyars, and Rumanians: Y-212
 Vriesland, Netherlands. *See in Index* Friesland
 Vuillard (vú-é-yúr'), Jean Édouard (1868-1940), French painter, lithographer; impressionistic, influenced by oriental prints; portraits, decorative interiors, still lifes.
 Vulcan (vúl'kán), in Roman mythology, god of fire and metal working; identified with Greek Hephaestus: H-281, *picture* M-328
 Vulcanism, volcanic activity P-197, 198, V-331-4
 Vulcanite, rubber hardened by combination with a large proportion of sulphur at high temperatures; used for combs, phonograph records, insulation.
 Vulcanizing of rubber R-164, 167-8, 169c
 Vulgate, Latin Bible B-103
 Vulpes, the fox genus.
 Vultava River (Czech Vltava, German Moldau), important waterway in Bohemia, rises near s.w. frontier flowing generally n. through Bohemia 265 mi. to Elbe: *map* A-381
 Prague on P-341
 Vulture, a large carrion-eating bird V-336, *picture* C-329, *color plates* B-130, 135
 buzzard B-288
 condor C-328-9, *picture* C-329, *color plate* B-130
 secretary bird related S-73
 Vulturidae, an Old World family of vultures V-336